

skin diver

diving action around the world

UK (70p) APRIL 1976
02099

\$1.25



Buoyancy Compensators: What They Are-What They Do

**Diving Pennekamp
Park's "Elbow"**

**Roatan's Magical
Keyhole in the Reef**

What is Bone Necrosis?

SDM Spotlights:

- Farallon Mask
- Scubapro Knife



WE'RE NOT JUST ANOTHER PRETTY FACE

Behind those faces our real beauty lies. It begins with an attitude . . . don't compromise quality for quantity. We feel that you shouldn't have to buy any instrument but once. It should be made of the finest materials available and assembled and tested by people who take pride in their skills; using the industries' most sophisticated assembly and testing facilities. That's a Farallon instrument.

Farallon has pioneered a number of substantial

advancements in diving instrumentation. Illuminated gauge faces, high strength Lexan housings, ultrasonically bonded cases, our own incredibly tough hose and not the least, that clear easy-to-read face. Add to all this our totally modular construction that lets you build an instrument system to your own needs, and you'll see why we're the world's largest manufacturer of dive instrumentation. At Farallon—beauty is more than skin deep.



Farallon Industries, Belmont, California

Sport diver or pro, you can't beat the Poseidon System.

Imitators try to copy our Unisuit, but they can't even come up to our bootstraps.

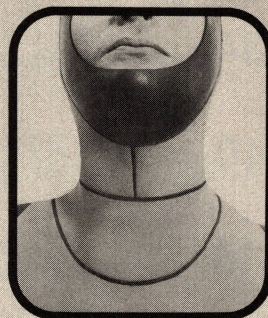


New attached vulcanized boots protect diver's feet and the Unisuit. Non-skid soles for walking safety.

Now, a few small but very important new innovations make Unisuit better than ever.

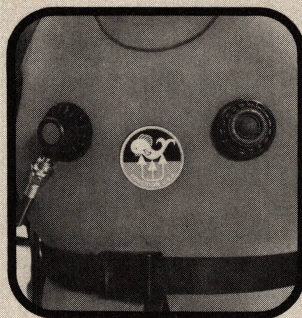
Unisuit divers still ride up and down at the touch of a button, or achieve neutral buoyancy at any depth.

Unisuit has been re-shaped for a closer contoured fit that still provides the most amazing dry thermal protection



Many seams have been modified or eliminated to provide greater comfort.

The indestructible new Cycloc plastic Unisuit valves work flawlessly, and they can't corrode.



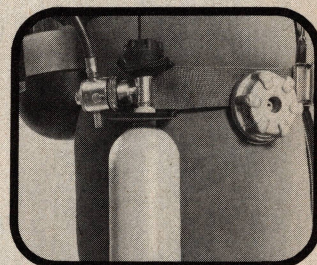
while using only tiny amounts of scuba air.

Combined with the world's easiest breathing regulator (the only one that handles up to 4500 psi)

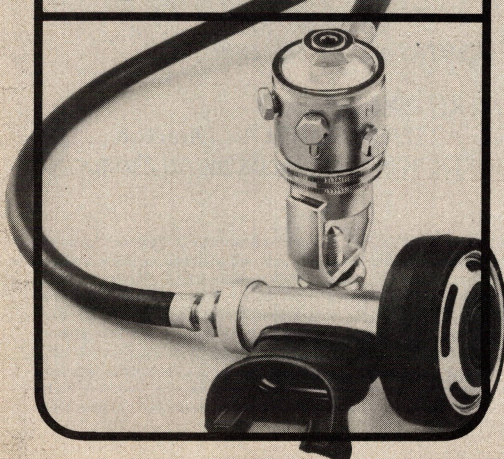
and accessories like our pressure gauge, anti-freeze unit or full face mask, Poseidon is every diver's life support system.

Let's see the imitators beat that.

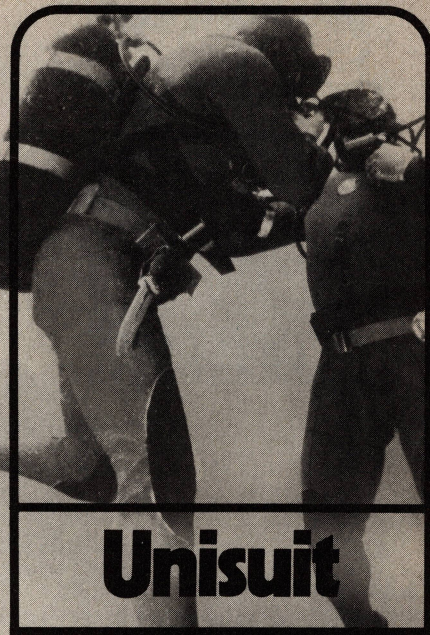
The optional 3000 psi independent suit inflation system is especially important for the mixed gas pros.

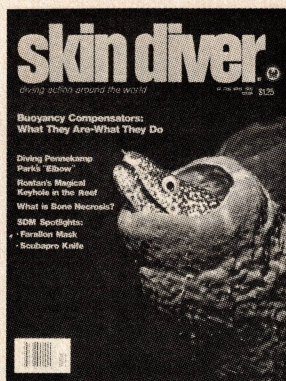


Cyklon 300

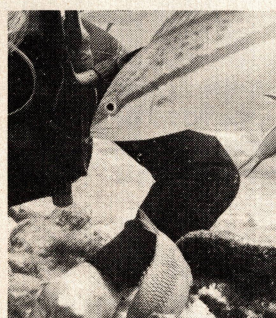


POSEIDON SYSTEMS U.S.A. division of Parkway Fabricators Inc.
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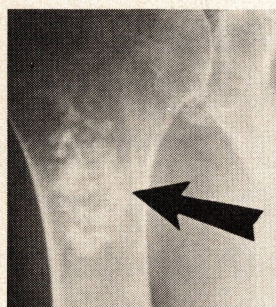




Cover—This curious spotted moray peeks out from a tube sponge. The photo was taken during a night dive on Porch Reef off the Hotel Bonaire, in Bonaire, by Paul Tzimoulis with a Nikonos II camera and close-up lens attachment, and a Sub-sea Mark 150 strobe.



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Going my way?

Florida Institute of Technology – Jensen Beach Campus is offering special college credit programs and high school sessions again this summer. Earn twelve college credits or special high school credit while swimming, snorkeling, and exploring Florida for six weeks. Some programs will also dive the crystal clear waters of the Cayman Islands.

If you are interested in Oceanography, Environmental concerns, or improving your SCUBA Knowledge, investigate one of these programs:

Marine Environmental Studies – 12 credits in Oceanography; Biology; SCUBA; Photography. Dive and learn in the cool blue waters of Florida and spend a week diving the nonpareil reefs of the Cayman Islands.

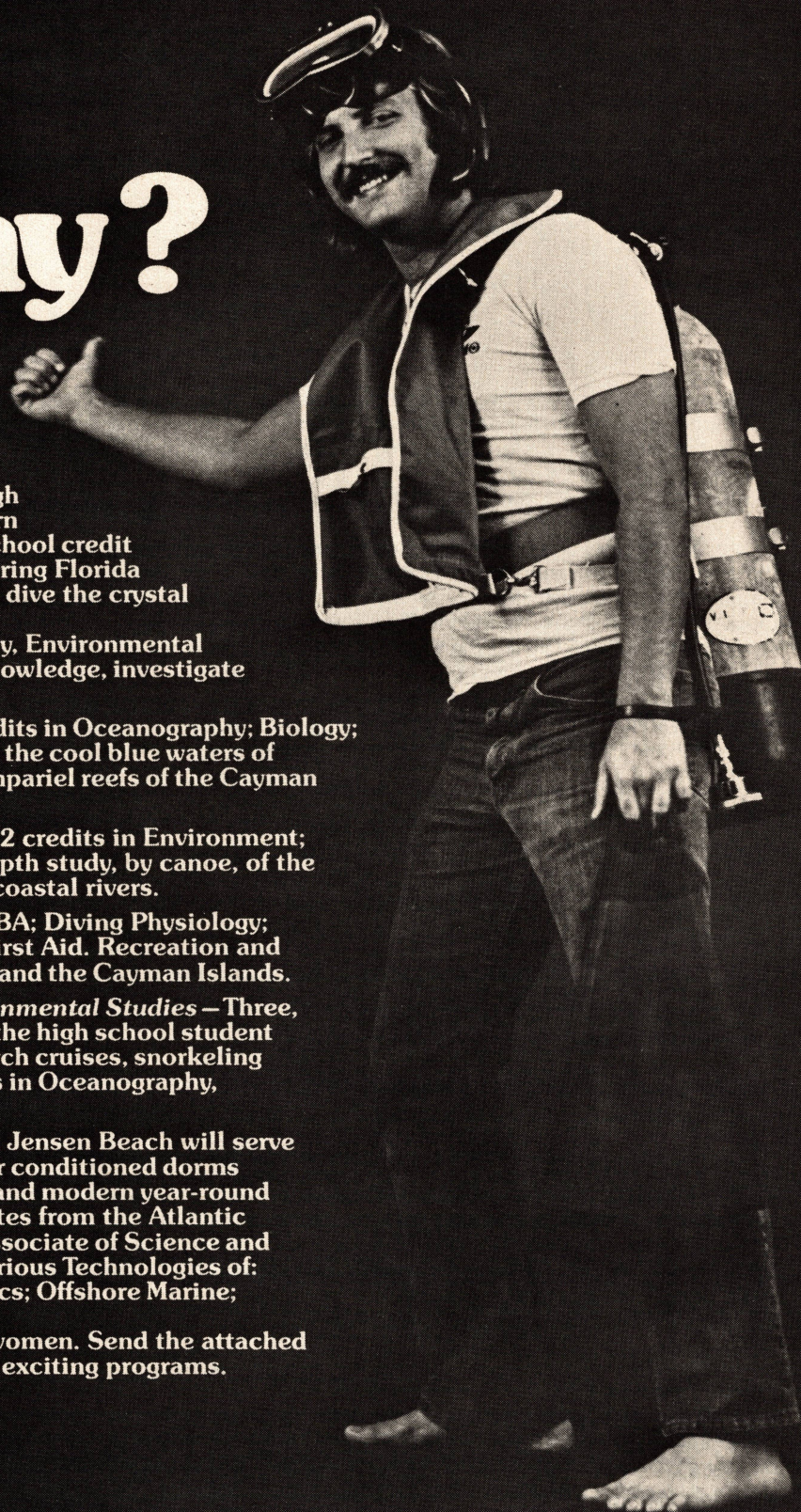
Environmental Immersion Program – 12 credits in Environment; Biology; SCUBA; Photography. An indepth study, by canoe, of the flora and fauna of selected inland and coastal rivers.

Diving Technology – 12 credits in SCUBA; Diving Physiology; Recompression Chamber Operation; First Aid. Recreation and Study in the diving paradises of Florida and the Cayman Islands.

High School programs in Marine Environmental Studies – Three, two-week programs designed to orient the high school student toward the marine environment. Research cruises, snorkeling along Florida reefs, and special lectures in Oceanography, Ocean Biology, Photography.

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All programs are open to men and women. Send the attached coupon today for information on these exciting programs.

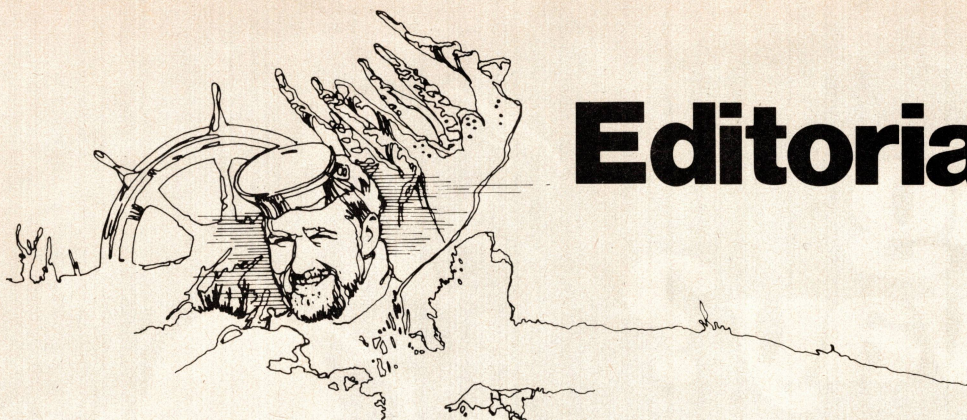


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Editorial

TIME FOR A SPRING TUNE-UP

by the Publisher

When your automobile engine begins stalling out at traffic lights or refuses to start in the morning, you know it's time for that annual ritual called a "tune-up". Those telltale signs are hard to ignore, and you soon find yourself at the local garage having the carburetor adjusted and worn ignition parts replaced. And though most of us are not too happy about it, we are resigned to the fact that shelling our \$40 to \$120 for the engine tune-up is just part of the joys of owning an automobile. Our only consolation is in knowing the old car will run better, start easier, and probably get a lot better gas mileage.

Why then, are so many divers reluctant about having their scuba regulators serviced once a year? Much like the automobile engine, a regulator suffers from the same problems of worn parts and clogged dirt, thus requiring the same kind of perennial maintenance. Yet an astonishing 50% of all regulators in use today have not received proper servicing in more than a year. And an estimated 25% have never had a good cleaning or readjustment in three years!

Divers who don't bring their regulator in for regular check-ups are simply unaware of all the things which can go wrong inside. What they cannot see cannot possibly hurt them. They figure if it still breathes, it's fine — a totally incorrect assumption! The fact of the matter is that no diver can really tell if his regulator is performing up to specification without having it put on a test machine to check for: a) inhalation resistance; b) exhalation resistance; c) air-flow; d) correct intermediate pressure setting. It might appear to be breathing fine on the surface, but what about the performance at 100 feet? And what about its performance in a heavy breathing situation?

Dr. Glen Egstrom of UCLA has recently been conducting a series of tests on scuba regulator performance as part of his ongoing Sea Grant Diving Safety Research Project. He has found that approximately 25% of the regulators involved in fatal diving accidents have proven to be badly out of tune. Their poor performance could well have been a key contributing factor to the accident

situation. In every case the regulator was found to be functioning well mechanically, but required three to four times more effort than normal for breathing. Egstrom attributed this poor breathing performance to lack of regular maintenance and periodic tune-ups. "People are running their regulators into the ground", said Egstrom, underscoring the vital need for a better program of regulator maintenance.

The greatest danger lies in the fact that most divers cannot tell when their regulator is out of tune. An increase in breathing resistance is virtually undetectable on the surface when a diver is well rested and taking slow easy breaths from the mouthpiece. Yet that very same regulator could prove to be a "killer" at depth, when a diver is experiencing great physical stress and breathing heavily. The air flow from the regulator is directly linked with the inhalation effort required to produce the flow. If the inhalation effort is too great (two to three times above normal) the diver will have to work too hard to obtain the air he desperately needs. The end result is a vicious circle in which the exhausted diver finds himself working ever harder to obtain more air to feed his exhausted circulation system. He soon finds himself "not getting enough air" — in reality working too hard for the air he's getting. It is often a prelude to panic or an emergency ascent.

Interviews with leading regulator repair experts have revealed about a half dozen common causes for poor performance in scuba regulators. Here are just a few of the things which are likely to go wrong:

- 1) A frequent cause of hard breathing is saltwater corrosion. Internal moving parts become encrusted and clogged with salt crystals, causing them to operate sluggishly. The result is triple or quadruple inhalation resistance, making it difficult or impossible to obtain high volume air flow in stress situations.
- 2) The filter on the first stage of the regulator can become clogged with rust from a tank which is loaded with internal corrosion. Also, the

fine rust particles will often coat the internal moving parts of the regulator causing the same sort of sluggish operation.

- 3) Another form of clogging comes from ultra fine carbon dust which is the by-product of a poorly operating air compressor. Usually this condition is often a result of a slow buildup and may go unnoticed for quite some time.
- 4) A deteriorating rubber exhalation valve in the second stage will often become gummed up, causing an increase in exhalation resistance and eventually a leakage of water.
- 5) Dirt and dust particles can cause first stage pressure leaks by destroying or damaging the high pressure valve seat. No amount of tightening on the first stage adjustment screw will cure this situation, and usually results in an additional damage to the regulator.
- 6) An internal buildup of salt corrosion or other foreign materials can also help destroy internal O ring pressure seals, resulting in first or second stage air pressure leaks.

In most every case described above, the regulator's performance can be vastly improved by an annual checkup and cleaning. Few replacement parts are needed, other than O rings, filter and exhaust valve.

This easy maintenance program consists of a total disassembly of the regulator, chemical or ultrasonic cleaning of the individual parts, and a reassembly and recalibration of the correct pressure settings. It should be done by a factory trained, professional regulator repair technician since he has the proper tools, parts and instruments on hand for servicing your regulator. The cost for such a job usually ranges from \$10 to \$25, depending on the regulator model and work required. It averages out to a cost of \$.85 to \$2.00 per month — incredibly low maintenance cost considering your life may depend on its performance!

Don't wait any longer, bring your regulator in for a spring tune-up, before the diving season begins. You'll breathe a lot easier. >#

New for '76



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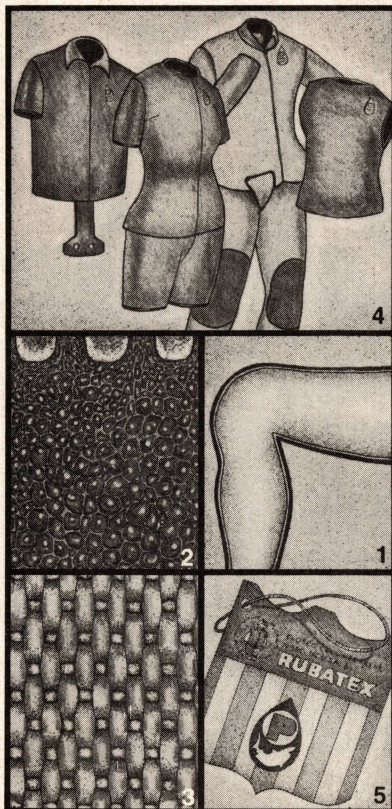
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PARKWAY Exposure Garment Quiz

TEST YOUR KNOWLEDGE OF THERMAL PROTECTION

- 1) A "Wet Suit" type exposure garment insulates best when it fits:
 - ☐ A. Very tightly
 - ☐ B. Loosely
 - ☐ C. Snugly
- 2) Worn by a diver at 66 feet a 1/4-inch thick neoprene exposure garment will be:
 - ☐ A. Unchanged
 - ☐ B. Less than 1/8-inch thick
 - ☐ C. 3/8-inch thick
- 3) The outer texture of a Shark-Skin Two suit provides:
 - ☐ A. Greater flexibility
 - ☐ B. Abrasion resistance
 - ☐ C. A cooling effect between dives
- 4) For personal comfort and safety divers may need exposure garments in:
 - ☐ A. Cold climates only
 - ☐ B. Warm climates
 - ☐ C. Anywhere in the world
- 5) The finest exposure garments are made of neoprene that is:
 - ☐ A. Imported
 - ☐ B. Chemically blown
 - ☐ C. Blown with nitrogen



ANSWERS: 1) "Wet Suit" type exposure garments insulate by trapping a body-warmed layer of water. Loosely fitting suits allow cold water to "pump" through. A very tight fit can inhibit blood circulation and restrict mobility. Parkway suit patterns are made from thousands of body measurements so that they provide the snug fit that insulates best and feels most comfortable. And divers with extraordinary shapes can order custom made Parkway exposure garments that fit snugly like a second skin. C is therefore the correct answer. 2) Exposure garment neoprene rubber contains thousands of tiny cells filled at atmospheric pressure. Upon descent these compress in direct proportion to the ambient pressure. B is the correct answer because at 66 feet the ambient pressure is 3 times atmospheric, compressing the suit to 1/3 its original thickness. 3) Eighty-four "puckers" per square inch give Shark-Skin Two suits amazing hingeability. They bend and flex to help reduce diver fatigue. They also toughen the surface and minimize abrasion. Between repetitive dives the spaces between these "puckers" trap beads of water that help cool the suit and the diver within. Therefore, A, B and C are all correct. 4) Even in the warmest waters prolonged exposure carries off body heat and eventually results in decreased diver efficiency and safety. Because C is the correct answer, Parkway makes a full range of exposure garments. Shirts, shorties and tunics for warm climates and shallow dives. Full suits of every kind for cold climates and deep dives. 5) Durable Rubatex G231 N used in all Parkway suits has proven to be the softest, most flexible and best insulating neoprene for exposure garments. So C is the correct answer.

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skin diver

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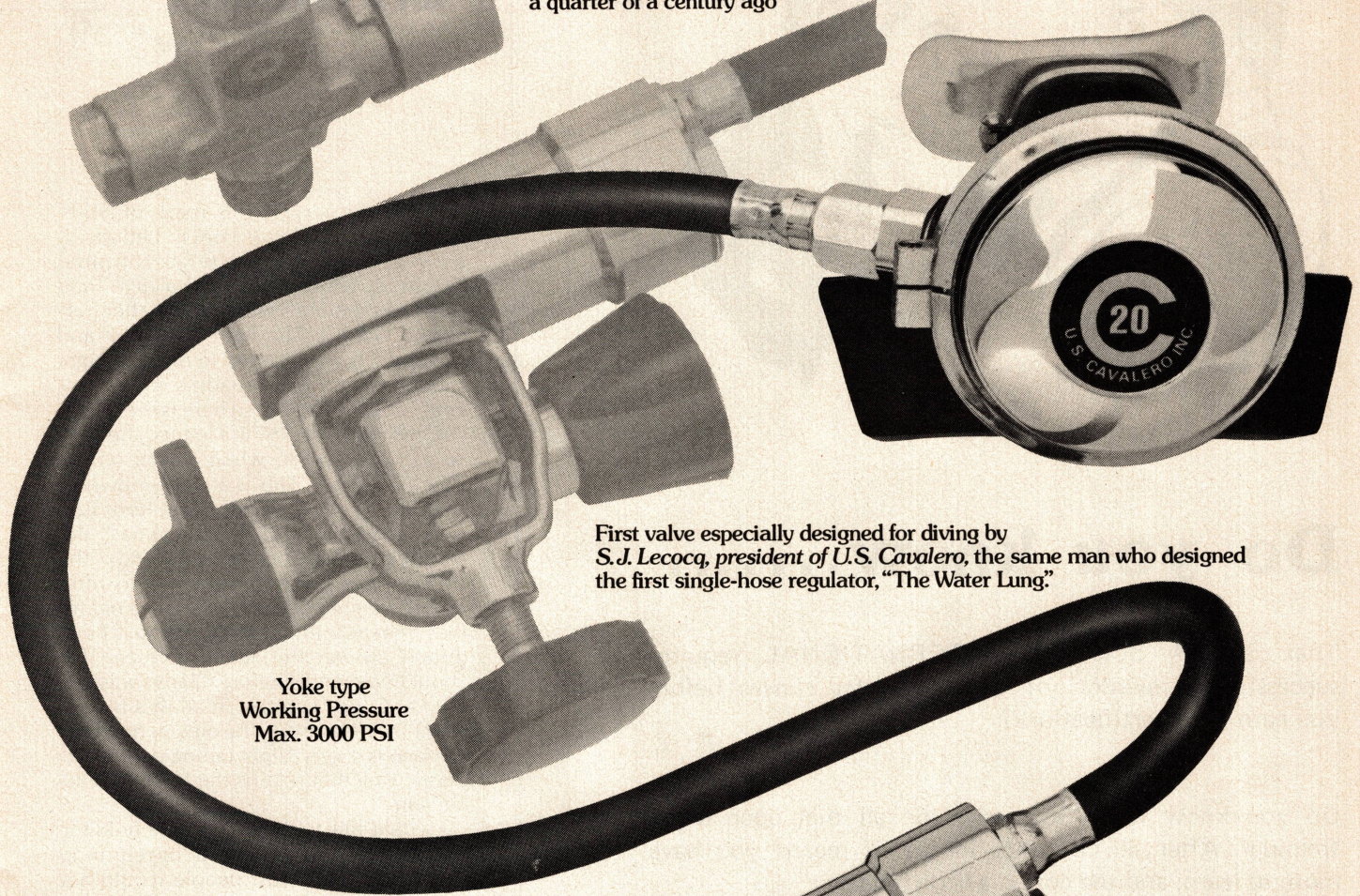
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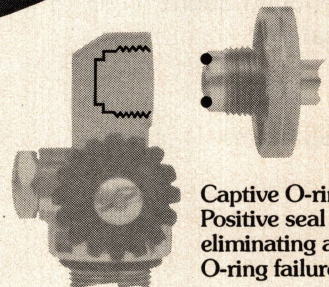
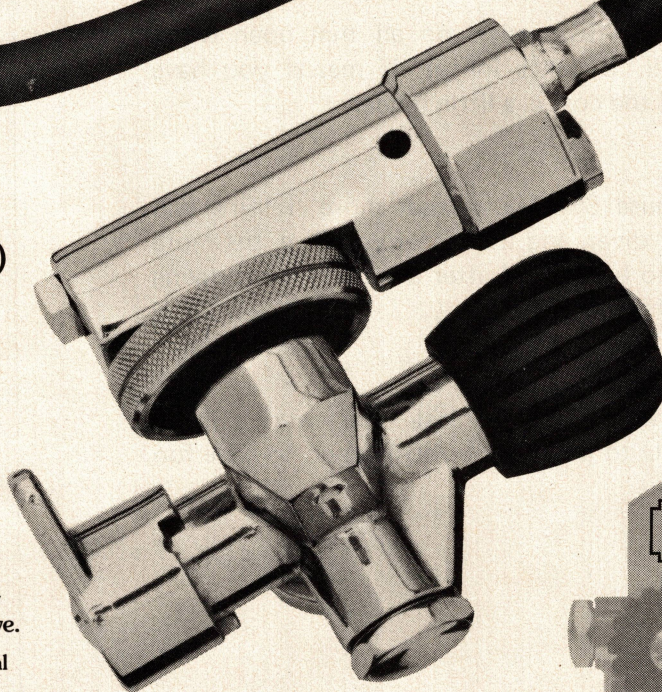
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Do you know WHY SSI insists on all that open water training? After all, it takes longer, it means you have more to learn, and the cost is a little higher.

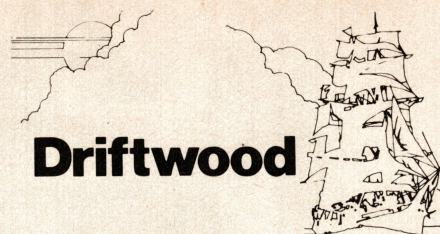
It's required because SSI knows that more training will make you a better diver, and the better you dive, the more fun you're going to have. And after all, that's what diving is all about.having fun.

Think about it, when was the last time anyone cared enough about YOU to make sure you learned to have fun safely?

SSI cares. . . .a lot!



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(303) 482-0883



... The January, 1976 issue of SKIN DIVER carried a letter from R. Littlefield, a ranger at Cape Hatteras National Seashore, which described a dive light that he had found on the beach after hurricane Gladys. The light was mine and has since been returned to me. I thought that some of your readers might appreciate a follow-up, so here is the story:

On August 10, 1975, I loaned the light to a friend to use while diving on the Spanish Wreck. This is an old shipwreck that lies about eight miles out from Barnegat Inlet, on the New Jersey coast. Before beginning his ascent at the end of the dive, my friend attached the light to a clip on his weight belt. It disappeared before they reached the surface. It must have drifted around the Atlantic Ocean for about two months before Gladys washed it up at Cape Hatteras. In all that time it never leaked a drop! The only permanent damage is a very slight fading on the red plastic ring that retains the lamp, due to the sun.

I would like to thank Mr. Littlefield for his honesty and his efforts in returning the light to me. Most people would not have bothered. I guess that divers just have a greater than average concern for each others' welfare.

Incidentally, this affair should provide a good lesson in the dangers of hanging gear from the belt or harness and the advantages of properly labeling equipment for identification.

R. MEENAN, JR. HAWTHORNE, N.J.

Ikelite could not possibly get much better product testing results than the aforementioned situation! And SKIN DIVER certainly cannot afford to do such extensive or lengthy testing.

... This letter is written in regard to asthma and how it relates to scuba. I am aware that asthma is an absolute contraindication to scuba diving. However, I am interested in just how much work has been done in this area and how much knowledge has been acquired as regards asthma and diving. I am also aware that asthma covers a wide range of severities and am interested in knowing why this affliction is contraindicated regardless of severity or type of diving done.

I would appreciate if you could send me some information concerning this and if you also might supply me with the name or names of persons who could

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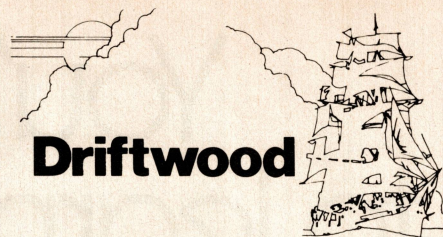
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T. E. BALL ORONO, MAINE

We would certainly be more than happy to forward any information sent to us on this matter, or to send you their names when notified.

... At our last divers club meeting on January 7th, many ice divers took issue with Item 14 of the January '76 Ice Diving Exam, pg. 19, the fastening of the life line. We feel that this is bad advice inasmuch as it is very difficult to get the ice chisel to stay securely in place in the ice. Most divers we have found will not take the time to make sure the ice chisel is truly frozen in place, and should they tie their life line to high on it they will have enough leverage to jerk it out of the ice. Note: that we prefer the word life line instead of safety line because of the significance of that particular line. Our own practice is to have a line tender, shod with boots with spikes or clamp-ons so that he does not slip on the wet ice or in the hole. The life line must be tied around him so that he cannot drop it, and he must be warmly dressed so that he would stay in place until the last diver has returned. We also tie life lines to large items like ice fishing shanties which could not even be pulled through the hole. We think the balance of your quiz on ice diving is a good one, and hope that you see fit to publish our comments on the use of the ice chisel. We think that it is hazardous advice especially for those who will use your information and go out and try a dive by themselves.

T. D. GRAHAM MILWAUKEE, WI.

Question number 12 on the National Scuba Exam series for December '75 has caused several readers to respond due to confusion created from the wording of the question. We would like to explain the intention of the question and eliminate the confusion.

The question was worded: "A fully equipped diver weighs 192 pounds and uses 20 pounds of lead for diving neutrally buoyant in the ocean. Using the same equipment, approximately how much weight will the diver require for neutral weighting in fresh water?"

The diver and equipment displace 192

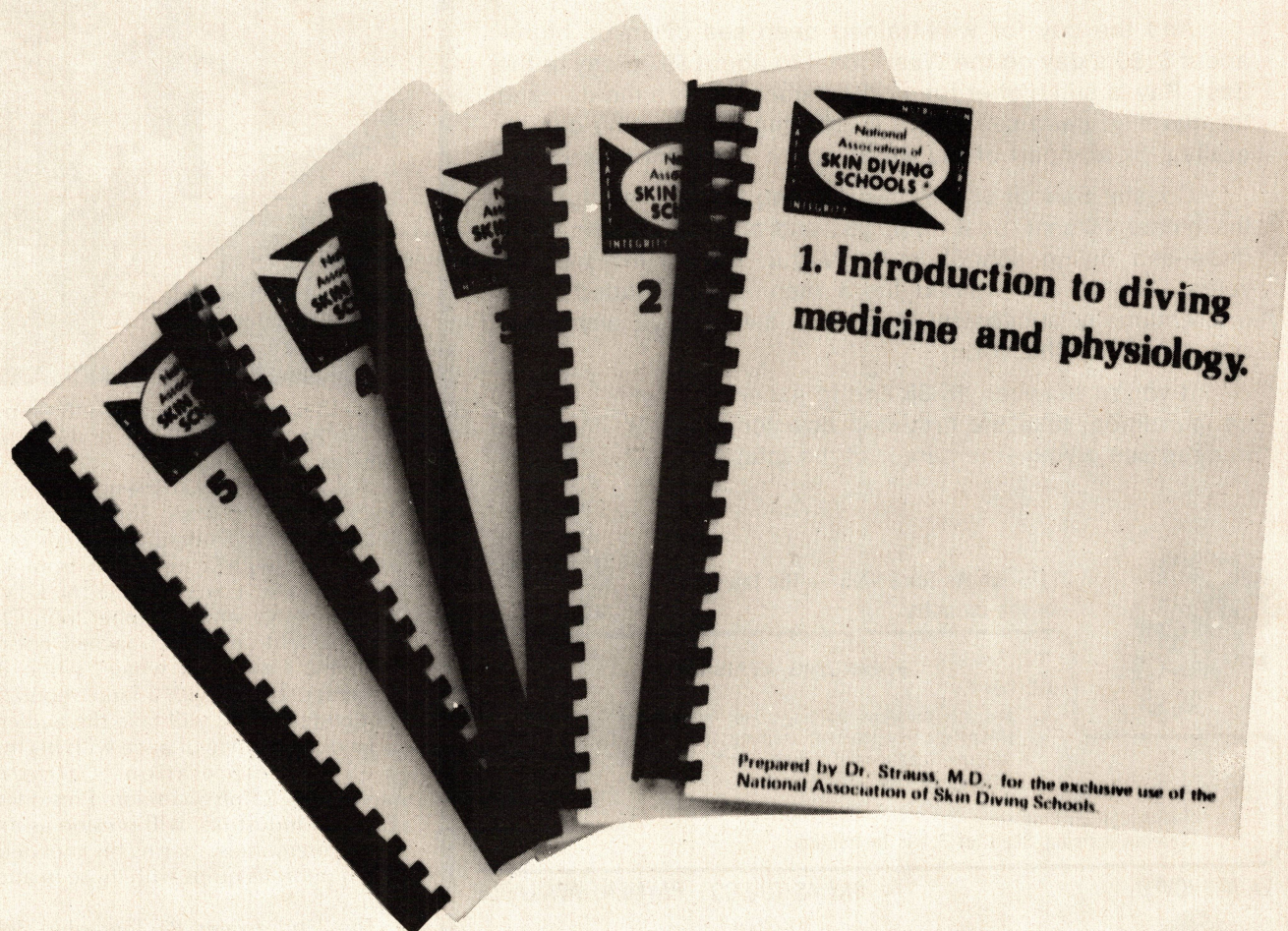
(Continued on Page 14)



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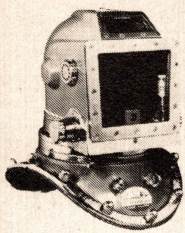


In order to better the instructional abilities of all instructors, no matter what certification card is issued, NASDS is making their programmed approach to DIVING MEDICINE AND PHYSIOLOGY available to the diving industry. These books use the modern approach of programmed learning to teach the highly specialized medical aspects of diving.

Dr. Michael B. Strauss, M.D., is considered one of the foremost experts on this subject. He is presently on duty with the U.S. Navy at the Naval Regional Medical Center in Newport, Rhode Island and holds the rank of Commander.

These books are required by the National Association of Skin Diving Schools as pre-instructional clinic training aids and are used by the 10 week vocational Instructors College conducted by NASDS in San Diego. For more information on the College write: NASDS Educational Division, 1214 Rosecrans St., San Diego, Calif. 92106.

If you plan to be a diving instructor or simply want to increase your knowledge pertaining to these subjects, send \$40.00 check or money order or Master Charge Card number to NASDS, P.O. Box 7666, Long Beach, Calif. 90807.



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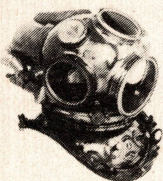


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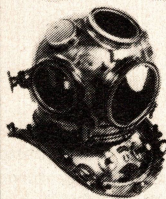
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Sea '76 May 8

The Underwater Photographic Society, Northern California Chapter, announces SEA 76 the 12th Annual International Underwater Film Festival and Photographic Competition. SEA 76 will



be held Saturday, May 8th, at 8:00 p.m. at the Paramount Theatre of the Arts in downtown Oakland.

SEA 76 will show all the new and exciting sea oriented films. The program will feature the charismatic mammals of the sea along with a new film from Jack McKenney, Editor of SKIN DIVER Magazine. Cinematographer John Clark will present an action packed episode with the humpback whale, while Bob Commer, a man with a large reputation in diving circles, will take the audience on a quiet change of pace with his multi media interpretation, *California Dreaming*. Ralph Shamlian, President of Farallon Industries, will preside as master of ceremonies, sharing his knowledge and humorous quips with those in attendance.

The Underwater Photographic Society, in an effort to increase involvement with photography in the sea, once again is sponsoring the annual Underwater Photographic Competition. Open to amateur and professional alike, the Society has set aside a special category for the novice and encourages participation for all those interested. The winning color and black and white prints as well as other special mentioned prints will be on display in the lobby of the Paramount during the night of the Film Festival. The awards include special cast aluminum emblems of the Underwater Photographic Society set on a plaque for first, second, and third place winners along with the coveted Best of Show award for overall photographic excellence.

Categories for the competition are as follows: Color prints; Black and White prints; 35mm or 120mm transparencies; motion pictures. Deadline on all entries is April 23rd, and for further information write the Underwater Photographic Society % Gary Cramer, 7200 Greenly Dr., Oakland, Ca. 94605. 📧

Oceanus Award To Waterman

On April 26 of last year a new award was presented for the first time to underwater cinematographer Stan Waterman at Our Future In Depth film festival in Syracuse, New York. This award was presented to Stan in recognition of the outstanding contribution that his skill and talent have made to our understanding of the sea.



Waterman receives first annual Oceanus award from Jere Hallenbeck at '75 festival.

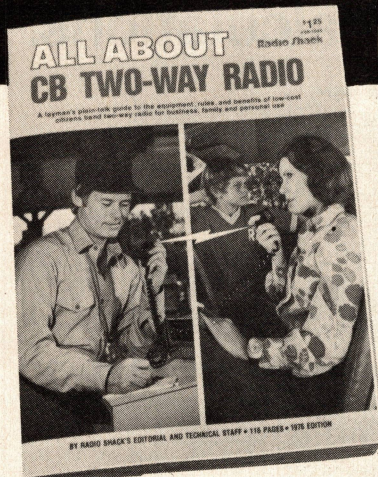
Although far from salt water, Syracuse is a center of diving activity because of its proximity to the Finger Lakes and the historic St. Lawrence River. Two pro dive shops and four active local clubs keep interest in diving at a high pitch all through the year.

The 1976 Our Future In Depth program will be held on April 10 at the new Syracuse Civic Center. This luxurious complex includes a 2200 seat auditorium for the evening show, plus ample facilities for the daytime seminars. The evening programs will again feature Stan, and will introduce Jack McKenney, SKIN DIVER Editor to the central New York audience. Other speakers and cinematographers of national renown will be featured. Diving clubs from all over New York will have displays of historical artifacts and photographs in the lobbies in competition for the New York State Divers' Association trophies. These trophies are awarded annually for the outstanding displays in several categories. The latest in underwater equipment will be on display in the manufacturers' exhibits. Representatives of island diving resorts will express the Caribbean theme with displays in the travel section of the exhibits.

For more information about the program or the Clayton Link Scholarship, write to: Our Future In Depth, 1425 Erie Blvd., E., Syracuse, N.Y. 13210. 📧

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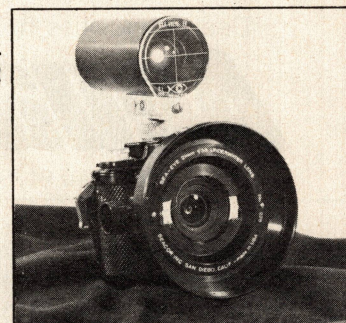
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Original "Nu-Way" Dive Tables eliminate the confusion of repetitive diving calculations.

THE "NU-WAY" REPETITIVE DIVE TABLES

TABLE 1-11: REPELITIVE DIVE TABLES FOR AIR DIVES										
DEPTH (feet)	1	2	3	4	5	6	7	8	9	10
10	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1	1
70	1	1	1	1	1	1	1	1	1	1
80	1	1	1	1	1	1	1	1	1	1
90	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1
110	1	1	1	1	1	1	1	1	1	1
120	1	1	1	1	1	1	1	1	1	1
130	1	1	1	1	1	1	1	1	1	1
140	1	1	1	1	1	1	1	1	1	1
150	1	1	1	1	1	1	1	1	1	1
160	1	1	1	1	1	1	1	1	1	1
170	1	1	1	1	1	1	1	1	1	1
180	1	1	1	1	1	1	1	1	1	1
190	1	1	1	1	1	1	1	1	1	1
200	1	1	1	1	1	1	1	1	1	1
210	1	1	1	1	1	1	1	1	1	1
220	1	1	1	1	1	1	1	1	1	1
230	1	1	1	1	1	1	1	1	1	1
240	1	1	1	1	1	1	1	1	1	1
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260	1	1	1	1	1	1	1	1	1	1
270	1	1	1	1	1	1	1	1	1	1
280	1	1	1	1	1	1	1	1	1	1
290	1	1	1	1	1	1	1	1	1	1
300	1	1	1	1	1	1	1	1	1	1
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870	1	1	1	1	1	1	1	1	1	1
880	1	1	1	1	1	1	1	1	1	1
890	1	1	1	1	1	1	1	1	1	1
900	1	1	1	1	1	1	1	1	1	1
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960	1	1	1	1	1	1	1	1	1	1
970	1	1	1	1	1	1	1	1	1	1
980	1	1	1	1	1	1	1	1	1	1
990	1	1	1	1	1	1	1	1	1	1
1000	1	1	1	1	1	1	1	1	1	1

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Suppose a diver makes a 60-foot dive for 25 minutes, spends 3 hours at the surface, and then wants to return to 70 feet for a second dive. How much time must he penalize himself for his first dive? See illustration above.

First, find 60 feet on the lower left-hand table (table 1-11). Move horizontally across to 25 minutes. Now go vertically up to the block that includes 3 hours surface time. Look to the right to the column that contains the depth of the second dive, in this case, 70 feet. The number 15 represents the residual nitrogen time in minutes. This is your penalty time, or the time you must assume you have already spent on the bottom before you start your repetitive dive. It's that easy.

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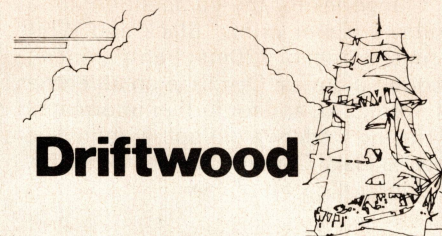
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(Continued from Page 10)

pounds of sea water or 3 cubic feet ($192 \div 64 = 3$). The diver using the same equipment will also displace 3 cubic feet of fresh water or 187 pounds of water ($3 \times 62.4 = 187.2$) and, therefore, will require approximately 5 pounds less weight than for ocean diving.

The intent was to include the weight of the lead in the diver's total weight. The words "fully equipped" were selected for this purpose. Readers, however, added 20 pounds to the diver's weight for a total of 212 pounds. This caused the confusion and the responses. The question should be reworded to read: "A fully equipped diver weighs 192 pounds including 20 pounds of lead...."

Thanks for the input and 'scuse the confusion.

... In an article in your January issue E. S. Tucker, M.D., discussed "Physical Standards for Sport Scuba Divers." He listed most of the physical standards but to me and a lot of fellow divers to be, he left out a very important physical characteristic, weight.

I, like a lot of other people, have a little extra weight on my bones and it shows. Are there suits that we can purchase (not in the immediate future) that won't show every little bulge in our bodies?
L. M. ALABAMA

... I am forming a B.S.A. Explorer post for scuba diving and would be grateful for the expressed interest of any scuba instructors who would be willing to participate in the activities as advisors. The post will be for boys, age 16-21, and advisors age 21 and older.
D. E. DODGE 109 ASBURY AVE.
OCEAN GROVE, NEW JERSEY 07756

... Man's World dive shop in Oak Ridge, Tenn., has been out of business for some time. Current Enterprises of Knoxville is, however, very much in operation and can be reached from Norris Lake in about half an hour. The owners, Harold Maples and son Lloyd, are more than ready to advise divers on local diving areas. They are open Monday through Saturday. During the summer months hours are extended until 8 p.m.
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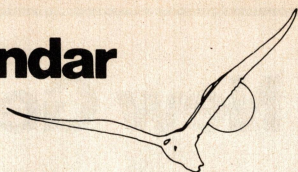
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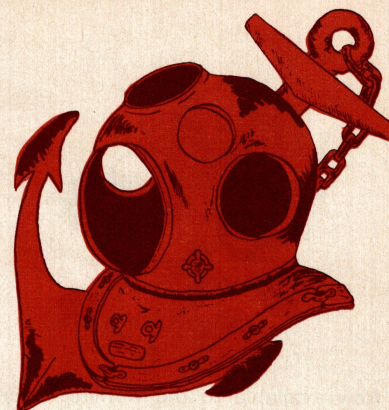


Calendar



- April 2
North Atlantic Diving Councils Convention, Harvard University, Boston, Mass. (Contact: Wayne Anderson, P.O. Box 908, Hyannis, MA 02601)
- April 3
4th Annual California Underwater Exposition, Anaheim Convention Center, 2 p.m. (Contact: California U/W Expo, P.O. Box 10931, Santa Ana, CA 92711)
- April 3
Underwater Symposium & Film Review, Boston, Mass. (Contact: Fred Calhoun, Box 291, Back Bay Annex, Boston, MA)
- April 3
3rd Annual U/W Panorama Film Festival — Planet Ocean, Westchester County, N.Y. (Contact: North Shore Diving Center, 58 Larkfield Rd., E. Northport, NY 11731)
- April 10
Our Future in Depth, Civic Center, Syracuse, NY. (Contact: Peter B. Perrault, 1425 Erie Blvd. E., Syracuse, NY 13210)
- April 10-13
PADI Cave Diving Program, Jacksonville & Branford, Fla. (Contact: R. S. Dickens, 7212 Eudine Dr. N., Jacksonville, FL)
- April 11
17th Annual Underwater Treasure Hunt, Tacoma, WA (Contact: Dennis Putnam, 7731 182nd Ave. E, Sumner, WA 98390)
- April 23
Underwater Photo Contest, Oakland, CA. (Contact: Underwater Photographic Society, Gary Cramer, 7200 Greenly Dr., Oakland, CA 94605)
- April 25
NAUI Instructor Underwater Film Review, San Diego, Calif. (Contact: NAUI South Pacific Branch, 4971 Mt. Gaywas Dr., San Diego, CA 92117)
- May 7-9
6th Annual Our World—Underwater Seminar, Symposium and Film Festival, Sheraton Chicago Hotel and Medinah Temple. (Contact: Joyce Markstahler, P.O. Box 643, Wheaton, IL 60187 [312] 286-8142)
- May 8
12th Annual Int'l U/W Film Festival, Sea 76, Paramount Theatre of the Arts, Oakland, CA. (Contact: Jeff Armstrong, 1889 Manzanita Dr., Oakland, CA 94611)
- May 12-13
Undersea Medical Society Annual Scientific meeting, Carillon Hotel, Miami Beach, FL (Contact: Undersea Medical Society, Room 200, 9650 Rockville Pike, Bethesda, MD 20014)

(Continued on Page 18)



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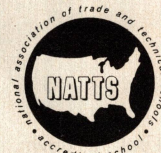
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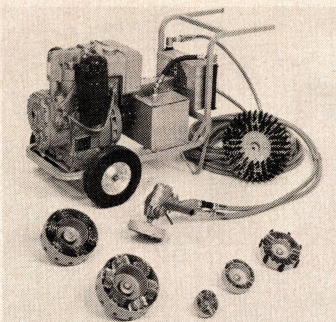


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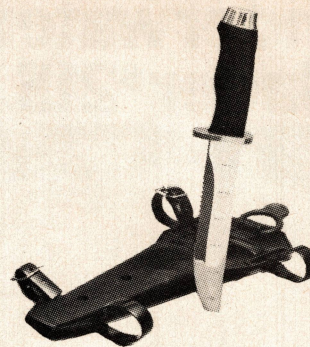
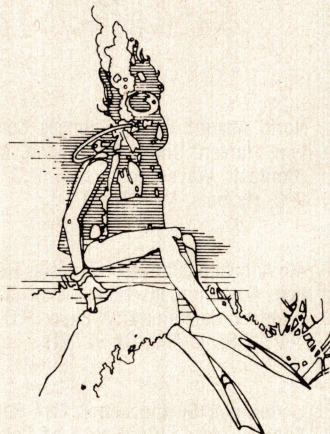
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Dept. S4

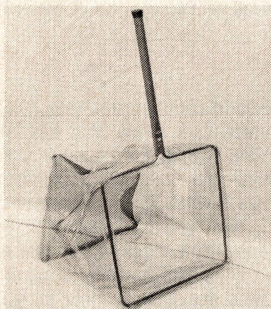
New Gear



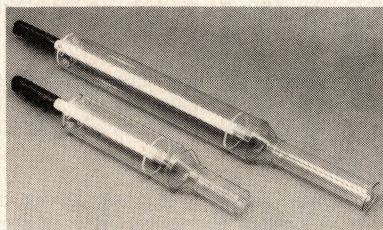
Now available to the working diver is a selection of specialized quick-disconnect handheld underwater power tools all powered by a new Hydra-Brush power pack. These tools include rotary action steel tools to remove the heaviest encrusted barnacle-type sea growth and even a series of soft and stiff brushes. Diesel operated. 247 lbs. \$3400. Custom Hydraulics, Inc., 6819 SW 81 Terr., Miami, Florida.



Healthways is introducing their new Seadiver Knife and Sheath. The knife has a stainless steel 6 $\frac{3}{4}$ inch blade that boasts a serrated cutting edge. It also features six, one inch increments etched in a measuring scale on the side. The knife, including the slimline sheath with heavy gauge black straps, is priced at \$17.50. Healthways, 5340 West 102 Street, Los Angeles, California 90045.



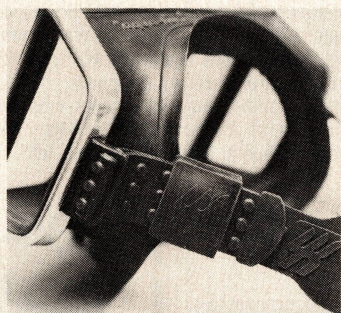
The new Collector's Net was designed for those divers that collect tropical fish for profit or pleasure. The net is made of heavy gauge plastic with a non-corrosive net bottom. Available in a more than adequate, 12 inch by 12 inch by 16 inches deep. This size should be able to handle most any size specimen. The price of net is \$16.95. Gulfview Divers Headquarters, 101 Bridge St., Bradenton Beach, Fla.



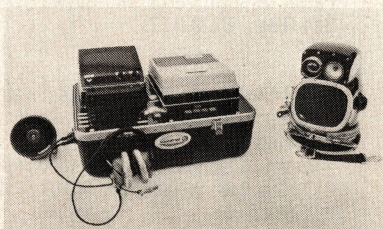
Aqua-Craft has added two new slurr gun designs: the compact Junior and the economical Intermediate. Both guns are made of tough Butyrate and have no corroding parts. The simplified design of these guns make it possible for many more people to enjoy the fun of collecting. The Junior, Catalog #A-239, is \$17.95 and the Intermediate, #A-248, is \$26.00. Aqua-Craft, 3280 Kurtz St., San Diego, Calif. 92110.



Seatec's SID 200 is a standard inflation device that was devised to replace the CO₂ cartridge on a buoyancy compensator. The hose simply screws in the regulator first stage like any other mechanical inflator, and then screws into the CO₂ detonator mechanism. Air flow in the buoyancy compensator is controlled by activating the CO₂ detonator lever. \$19.95. Seatec, 425 W. Palmyra Street, Orange, Calif. 92666.



Lock it down, with the new Aqua-Craft Mask Strap Keeper. Designed to stop mask slippage, the Mask Strap Keeper features a slim line design and a corrugated interior. These handy little items are sold in pairs and are made of molded rubber. New from Aqua-Craft, their catalogue number is A-232. They sell for 90c per pair and are available from Aqua-Craft, 3280 Kurtz Street, San Diego, California 92110.



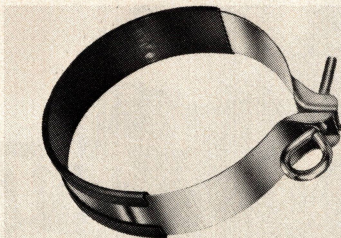
The Observer II was designed to supply the production engineer a tool which will help with supervision of a diver's performance in the repair of marine structures. The television permits low cost video tapes of all work and supplies a permanent record of previous structural and mechanical problems. Camera-Mask Assembly and Console both sell for \$16,000. General Aquadyne, 333 E. Haley, Santa Barbara, Calif.



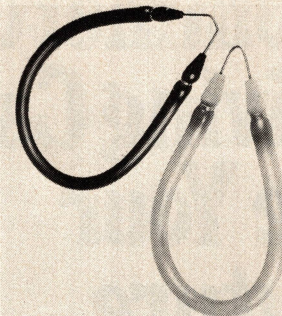
The PML-200 by Oceanic Products is a professionally designed, modular system movie light. It has the ability to be charged in or out of the housing and features a special battery pack of GE Goldtop rechargeable cells. The pack charges in five hours and burns the GE DWH movie light bulb for 12-14 minutes. The PML-200 with the charger is \$174.50. Oceanic Products, 814 Castro Street, San Leandro, Calif.



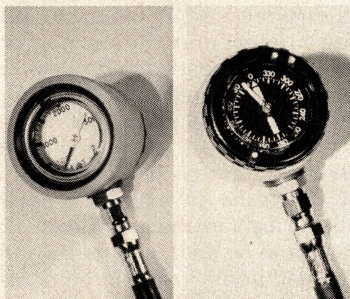
The Cyalume Lightstick is a new patented invention utilizing chemical luminescence as a bright, heavy duty light source. The Lightsticks are completely submersible and emit a yellow-green light. They are capable of remaining active for up to sixteen hours. Each Lightstick weighs one ounce and measures $\frac{1}{2}$ " in diameter by 6" in length. \$3.95 for 3. Bohannon Enterprises, 16 Sorrell Avenue, Plattsburgh, New York.



Scubapro's new rubber tank sleeve was devised to insure a secure grip between a diver's air tank and back pack band. Because it is made of rubber, this tank band also is capable of inhibiting electrolysis. The tank sleeve for the standard back pack, or Scubapro's 180 band, is priced at \$2.50; the tank sleeve for the 181 band, or cam release back pack, also costs \$2.50. Scubapro, 3105 Harcourt, Compton, California.



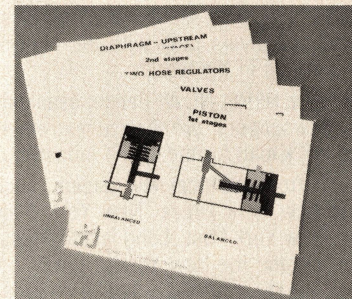
Scubapro offers a selection of power slings for all Scubapro spearguns. These slings are available for each size Scubapro gun in both regular and high impact strengths. The power slings shown are for either the 35 or 36 inch guns. The regular sling, catalogue #635-26, is \$4.50; the high impact, heavy duty sling, #635-36, is \$6. Power slings are available from: Scubapro, 3105 E. Harcourt, Compton, Calif. 90221.



White Stag's new Console offers a pressure/depth reading at a glance, with a Deep II compass on the back side. The submersible pressure gauge face is luminous and 2" in diameter. It is calibrated to 4000 psi. The depth gauge is capillary and located in the face of the pressure gauge lens. These all feature a safety orange protective cover and 35" hose. \$65. White Stag-Water Sports, Box 5308, Carson, Calif.



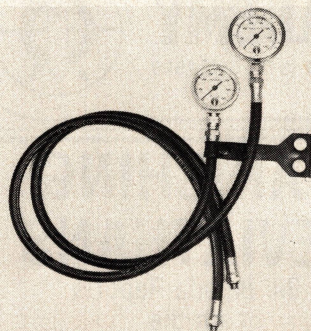
Seatech's new pushbutton switch is waterproof, spark-proof, and gas-proof. It is rated for 100 amperes at 12V DC. It can control deck winches, engine starters and other heavy loads directly. The high strength plastic housing is non-corrosive, non-conductive and O ring sealed. Good for depths up to 30 feet. \$15. The pressure compensated model is \$25. Available from Seatech Corp., 985 NW 95 St., Miami, Fla. 33150.



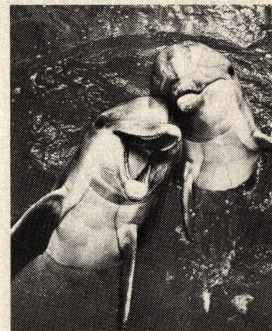
Healthways is now offering to dive shops and instructors a set of six regulator and valve charts that show the principle of regulators and valves as they are made today and the way they were made in the past. These five color charts measure 18 x 21" and are laminated in plastic. Designed to help students understand how their valves and regulators work, \$13.49. Healthways, 5340 W. 102 St., Los Angeles, California.



Aqua Sensor gloves allow divers to operate underwater with barehanded certainty. These gloves are light and strong as well as flexible. They are made of tough textured vinyl with a fabric lining. Aqua Sensor gloves are available in two sizes: medium, catalogue #H-25, and large, #H-26. Both sizes are each \$3.95 per pair. They are available from: Aqua-Craft, 3280 Kurtz St., San Diego, Calif.



The Pro Dive I and II tank pressure gauges allow maximum reading ease at all depths with this luminous dial. Both 3500 psi gauges swivel 360°. They feature a metal case with knurled bezel, replaceable Lexan® lens, O ring seal and a blowout plug. The Pro Dive I is \$44.50; the Pro Dive II, \$49.50 with capillary depth gauge. U.S. Divers Co., 3323 West Warner Ave., Santa Ana, California.



Seahawk Press is offering a new full color sea poster entitled Happy Dolphins. This beautiful reproduction is 19 by 25 inches and is printed on heavy poster stock. This poster can be purchased separately for \$3.25 or it can be ordered direct from the publisher with five other posters for \$15. A great idea for your walls or even for a gift. Seahawk Press, 6840 SW 92nd St., Miami, Florida.

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DIT ADDS A DOPPLER

The Divers Institute of Technology, Inc. of Seattle is now testing all diving students for residual nitrogen and helium in the blood stream after all deep dives and chamber operations by means of a Doppler Detector that has been developed and researched by Dr. Merrill P. Spencer who is located at the Providence Hospital in Seattle, Washington.

Dr. Spencer researched the Doppler system under a U.S. Navy grant and for several years the subjects were recruited from the Hyperbaric Research Facility in Seattle. With a clinical approach to the reading of the tapes, it was found that bubbles were present in the blood stream even after proper decompression procedures were followed. This fact has been further proven by divers tested by means of the Doppler after dives of 200 feet on air and HeO₂ in actual conditions while training at the Divers Institute of Technology. Dr. Spencer's staff and colleagues have trained instructors at the Institute in the use of the Doppler and the post dive records are being compiled to furnish interested diving contractors with what we believe to be a step in the promotion of safety and prevention of mild to serious symptoms of the bends. Only time will tell the true value of the Doppler to industry, however — it in no way affects the diver and it is possibly a breakthrough in the early detection of what could be damaging or painful post dive conditions. It should be noted that the Divers Institute of Technology has a very low incidence of diving accidents and they hope the use of the Doppler will lower this to a point where they can some day say there is a 100% accident free condition on all their water-related operations.

For further information concerning the Divers Institute of Technology, Inc., contact them at: P.O. Box 70312, 1133 NW 45th, Seattle, Washington 98107.

Calendar

(Continued from Page 15)

May 22-23

14th Annual Jasper Aquathon, Jasper Nat'l Park, Alberta, Canada (Contact: C. Sinclair, 10550 109 St., Edmonton, Alberta T5H 3B2 Canada)

September 25

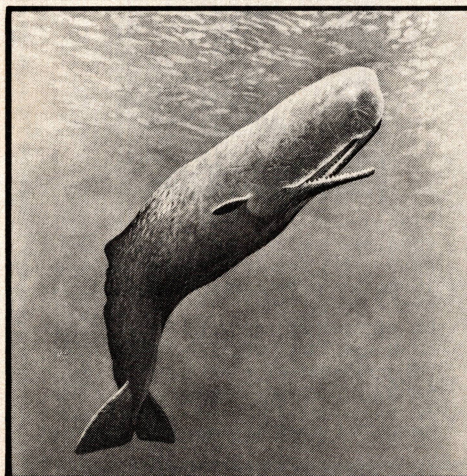
5th Inward to the Sea, Lisner Auditorium, George Washington University, Washington, D.C. (Contact: Inward to the Sea, P.O. Box 41010, Washington, DC 20014)

October 1-3

8th Int'l Conference on Underwater Education, San Diego, CA (Contact: NAUI Hdqrs., P.O. Box 630, Colton, CA 92324)

October 2

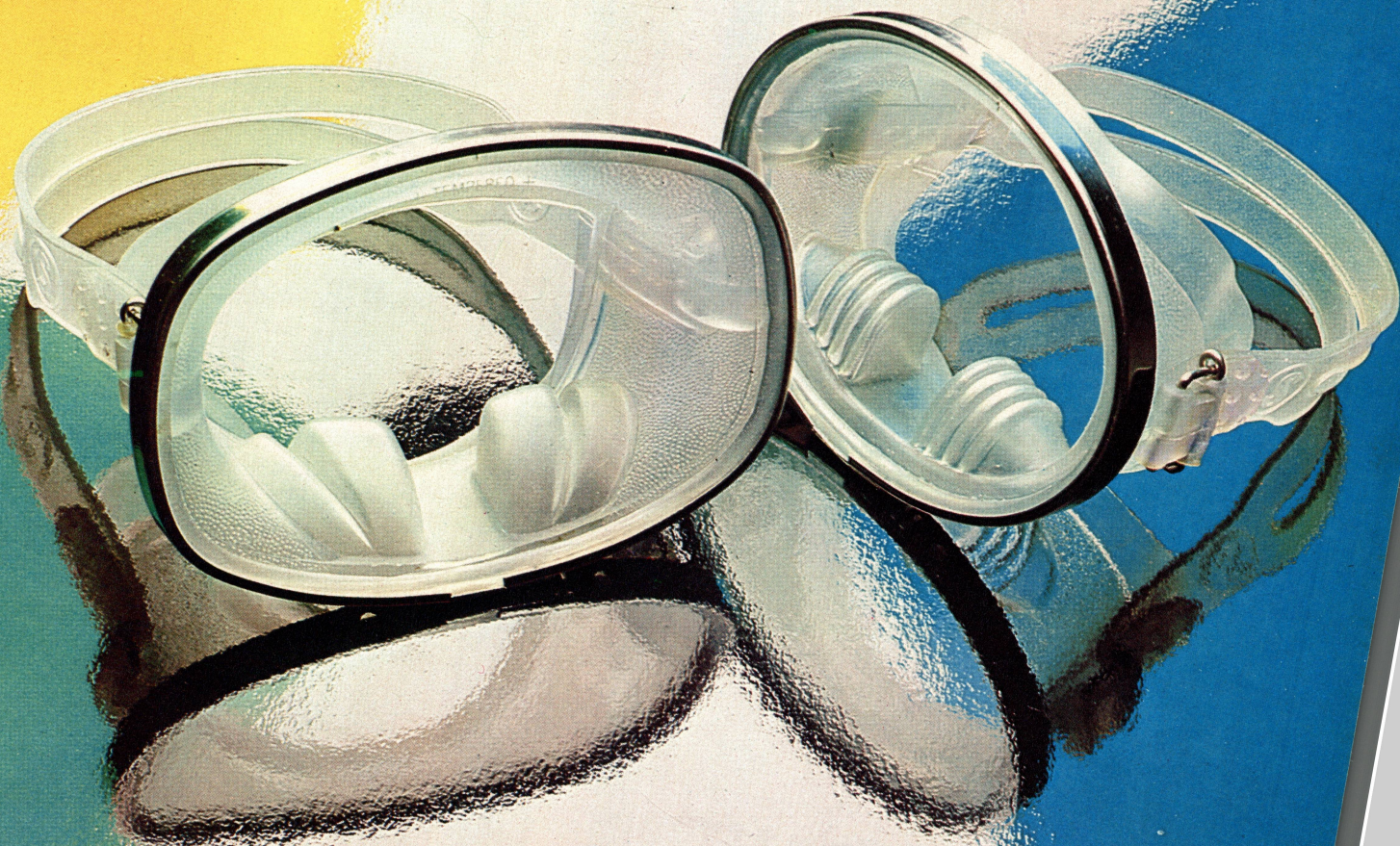
IQ8 Film Festival, San Diego, CA (Contact: NAUI Hdqrs., P.O. Box 630, Colton, CA)



VANISHING LEVIATHANS

Bill Barada Reports
on the
Sorry plight
of the

**great
whales**
in the May
skin diver



The Scubapro H/T Mask Is Nothing To Sneeze At.

Are you allergic to rubber or neoprene? Then you need a new Scubapro H/T (Hypo-allergenic/Translucent) Mask. This sophisticated new mask has a skirt which is specially compounded and cured to greatly reduce incidence of allergy effects from ordinary rubber or neoprene. Yet the skirt's soft, pliable texture is extremely durable and provides a comfortable seal on almost any face. If you haven't already noticed, the "T" stands for Translucent. That means ambient light enters the mask from all directions. Gives you that "open" feeling and lets you see motion even in the skirt periphery. See The Light Today. Try on a Scubapro H/T Mask . . . only from Scubapro.



Send \$2.00 for the New Full Color Catalog and Free Wet Suit Decal and Car Decal. Scubapro, Dept. S, 3105 Harcourt, Compton, Calif. 90221.

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- SCUBAPRO EUROPE SUISSE
- SCUBAPRO UNITED KINGDOM

Scuba Instructor Certification

April 4, 10, 24, 25; May 14-16

YMCA Scuba Instructor Institute, Lansdowne, PA. (Contact: Thomas A. McElwee, 46 Fairview Rd., Broomall, PA 19008)

April 5-June 24

PDIC Instructor College, Monterey. (Contact: PDIC, 320 Hoffman, Monterey, CA 93940)

April 5-June 11

NASDS Instructional College, San Diego, Ca. (Contact: NASDS, P.O. Box 7666, Long Beach, CA 90807)

April 5-June 11

PADI Instructor Training Course, Jacksonville, Fla. (Contact: PADI College, 4593 St. Johns Ave., Jacksonville, FL)

April 10-11, May 22-23, June 19-20

YMCA Scuba Instructor Institute, Williamsport, MD. (Contact: George Knode, 25 S. Vermont St., Williamsport, MD)

April 10-17

NAUI Instructor Training Course, Santa Barbara, CA. (Contact: NAUI, 2273 Cove Ave., Los Angeles, CA 90039)

April 23-25, & 30; May 1-2, 7-9

PADI Instructor Training Course, Chicago. (Contact: Ralph Erickson, 6033 N. Sheridan Rd., Apt 21G, Chicago, IL 60660)

April 24-25, May 8-9, 22-23

YMCA Instructor Institute, Sacramento, Reno, Watsonville. (Contact: Dave Drake, 224 San Antonio Way, Sacramento, CA 95819)

May 1-8

PADI Instructor Training Course, Tokyo, Japan. (Contact: Roy Goodman, Box 328 USAHH, APO San Francisco, 96343)

May 1-9

PADI Instructor Training Course, Nassau, Bahamas. (Contact: Fran Young, East Bay St., Box N-1658, Nassau, Bahamas)

May 4-6; July 9-11, 30-Aug 1

YMCA Instructor Institute, Little Rock, AR (Contact: Glenn Galtere, 2806 Harrisburg Rd., Jonesboro, AR 72401)

May 8-15

PADI Instructor Training Course, Akron, OH. (Contact: Bruce Reger, Pro Dive Shop, Inc., 280 West Ave., Tallmadge, OH 44278)

May 14-16, 21-23, 28-31

PADI Instructor Training Course, Nazareth, PA. (Contact: Ray Morrow, 138-C Beil Ave., Nazareth, PA 18064)

May 15

PADI Instructor Training Course, Chicago. (Contact: Larry Douglas, 12003 S. Cicero, Alsip, IL 60658)

May 15-23

PADI Instructor Training Course, San Marcos, TX. (Contact: Don Dibble, 1426 Ranch Rd. #12, San Marcos, TX 78666)

May 15-23

NAUI Instructor Training Course, Edinburg, TX (Contact: Don Lyles, 1407 Cedar Dr., Edinburg, TX 78539)

May 22-31

NAUI Instructor Training Course, Aviano Air Base, Italy. (Contact: Jim Haynes, TUSLOG DET 10, Box 1073, APO New York, NY 09289)

June

NAUI Instructor Training Course, Ann Arbor, MI. (Contact: Lee H. Somers, Univ. of Michigan, Space Research Blvd., 1216, Ann Arbor, MI)

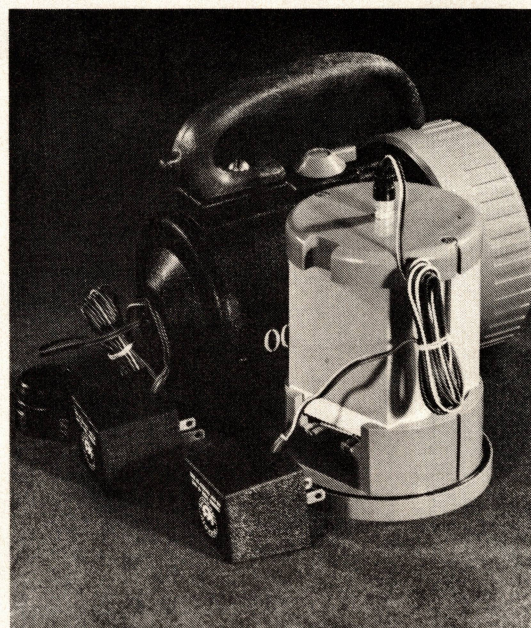
June

PADI Instructor Training Course, Okinawa. (Contact: Bud Higdon, BCO, H&S Bn (Base Spl Svc) MCB, Camp S.D. Butler, FPO Seattle, WA 98773)

(Continued on Page 31)

IN OR OUT... IT STILL GIVES YOU A CHARGE

Ocean Pro, the ultimate dive light, is modular in design and its rechargeable module may be charged either in or out of the light housing. This means that you can be diving with your light and have a spare module charging for your next dive. There is also a non-rechargeable light available — the modules of both lights are interchangeable. See this remarkable hand light system at your local pro dive shop.



For complete 1976 catalog, free decal and color brochure send \$1.25 to:

Oceanic Products
Dept. PR-OP
814 Castro Street
San Leandro, CA 94577



OCEAN PRO

AGA

DIVATOR SYSTEM

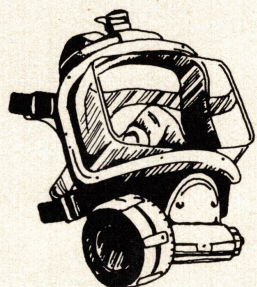


Karl I. Wallin

FOR THE GREATEST UNDERWATER ADVENTURE

The Divator 324 breathing system meets your needs any way you want to dive. You can get the complete compact system and use it as the most sophisticated scuba made or you can use individual components with your own equipment. Any way you do it, AGA's unique design features and renowned craftsmanship give you outstanding reliability and pleasure.

Ask your dive shop for a demonstration!

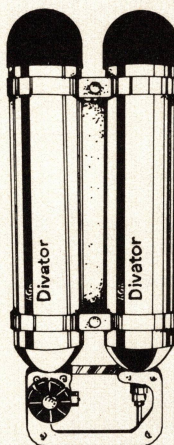
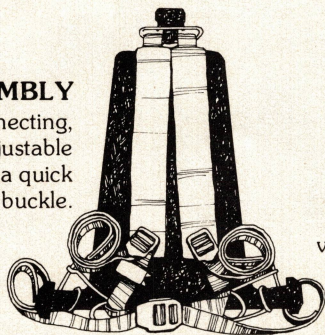


SPM-1 FULL FACE MASK

AGA's face mask is like breathing on land. It's non-fogging, contour fitting, non-flooding, and can be adapted for glasses, microphone and earphones.

HARNESS ASSEMBLY

The harness is quick connecting, has comfortable fitting, adjustable shoulder straps and a quick release buckle.

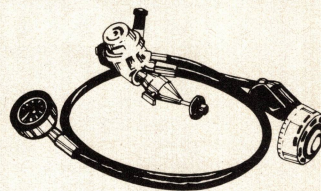


CYLINDER ASSEMBLY

The compact AGA Divator 324 features two 3.8 liter cylinders manifolded together for better balance, a closer fit to the body and better distribution of weight than a standard cylinder. And it operates at 4400 psi to give you more capacity. A protective fiberglass handle surrounds the cylinder valve and regulator assembly.

REGULATOR ASSEMBLY

Better operational performance with valves at hip level. Features a superior reserve system alert. Pressure gauge and reserve valve standard.



AGA

AGA Corporation, (Divator Division), 1163 Chess Dr., Suite G, Foster City, CA 94404 (415) 574-1826

A man with dark hair and a mustache stands barefoot on large, dark rocks at the edge of the ocean. He is wearing a black, textured wetsuit with a circular logo on the left chest. His hands are on his hips. The background shows the ocean with white-capped waves, a small sailboat in the distance, and a range of mountains under a clear blue sky.

TURTLESKIN

The Original™

The Imperial Turtleskin wetsuit is the longtime favorite of those who demand quality but appreciate a reasonable price. Top quality throughout, this suit is made of nitrogen-blown, closed-cell neoprene, with all seams triple-glued and sewn.

See the full line of Imperial suits, accessories, and gear at your favorite dive shop, or send a buck for your colorful 1976 catalog. BE A TURTLE!



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Imperial Manufacturing
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Scuba I.Q.

Test Your Dive Knowledge

What's Your Diving Fitness I.Q.?

A safe diver is a knowledgeable and skilled diver who is fit for diving. Fitness is every bit as important as the skill and knowledge. Test what you know about fitness by answering the following questions, then engage in a program to increase your level of fitness if not already doing so. Answers are on page 24.

1) **Fitness is best defined as:**

- ☐ A. The result of daily rigorous exercise.
- ☐ B. A condition attained through regular calisthenics.
- ☐ C. Ability to meet the demands of a particular activity.

2) **The primary advantage of fitness for diving is increased:**

- ☐ A. Efficiency.
- ☐ B. Endurance.
- ☐ C. Confidence.

3) **The best exercise to condition one for diving is:**

- ☐ A. Running.
- ☐ B. Swimming with fins.
- ☐ C. Diving in open water.

4) **To increase the degree of fitness for an activity, one should:**

- ☐ A. Perform exactly the same activity more frequently.
- ☐ B. Increase the workload of the activity.
- ☐ C. Exercise in related activities.

5) **To develop fitness, it is best to follow a program of:**

- ☐ A. Gradually increasing the exertion.
- ☐ B. Attempting the desired final results initially.
- ☐ C. Repeating the same activity on a regular basis.

6) **A woman can develop fitness for diving:**

- ☐ A. But is not expected to be as fit as male divers.
- ☐ B. Except during menstruation or pregnancy.
- ☐ C. The same as male divers.

7) **A medical examination for diving should be obtained:**

- ☐ A. Every year.
- ☐ B. Every year after age 25.
- ☐ C. Every two years until age 40.

8) **A chest X Ray should be obtained by a diver:**

- ☐ A. At the beginning of training.
- ☐ B. Every other year.
- ☐ C. Both of the above.

9) **Immunizations for certain diseases:**

- ☐ A. Are not especially needed by divers in general.
- ☐ B. Should be kept current by all divers.
- ☐ C. Are only necessary for polluted water diving.

10) **Which of the following conditions should absolutely prevent a person from engaging in diving activities:**

- ☐ A. Epilepsy.
- ☐ B. Diabetes.
- ☐ C. Claustrophobia.

11) **Diving with a cold:**

- ☐ A. Is permissible if one can equalize.
- ☐ B. Is feasible with proper medication.
- ☐ C. Should always be avoided.

12) **Fitness for diving is greatly affected by pre-dive:**

- ☐ A. Diet and rest.
- ☐ B. Apprehension and anxieties.
- ☐ C. Both of the above.

13) **Drugs should be used when diving only:**

- ☐ A. If prescribed by a doctor for a specific ailment.
- ☐ B. If the drug is non-prescription.
- ☐ C. With a doctor's approval and when effects are known.

14) **Fitness in a given area can be developed in six to eight weeks. A decrease will be apparent after:**

- ☐ A. One week of inactivity.
- ☐ B. Three weeks of inactivity.
- ☐ C. Six weeks of inactivity.

15) **Fitness is a major concern to divers because fitness helps prevent diving accidents due to:**

- ☐ A. Lack of strength.
- ☐ B. Panic.
- ☐ C. Exhaustion.

Scuba I.Q.

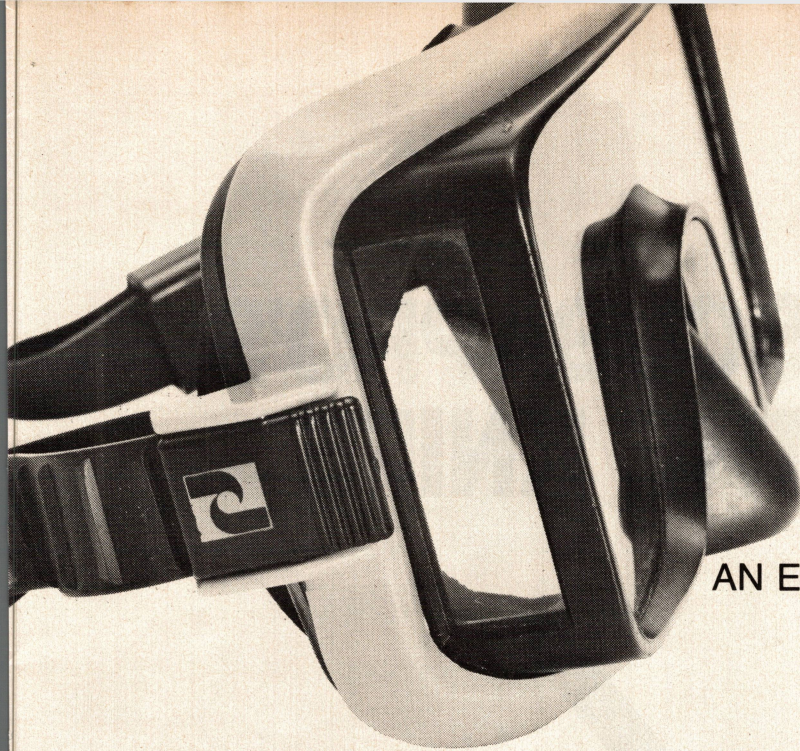
Test Your Dive Knowledge

What's Your Diving Fitness I.Q.?

Answers from questions on page 23.

- 1) C. Ability to meet the demands of a particular activity. Fitness in general can be developed, but to perform a specific activity efficiently and effectively, a person must be able to meet the demands of the particular activity. You can be fit to run and not to swim. A fitness program should be centered around the activity for which fitness is desired.
- 2) A. Efficiency. In trying to develop fitness for a particular activity, one becomes much more efficient at the activity. Endurance and confidence are fringe benefits of fitness for the activity.
- 3) C. Diving in open water. As in question #1, to develop fitness for a specific activity, a fitness program must closely approximate the actual activity. Push-ups and bowling develop fitness for push-ups and bowling. The best way to stay in shape for diving is to dive regularly. Swimming with mask, fins and snorkel also helps maintain fitness for diving.
- 4) B. Increase the workload of the activity. To become more fit for an activity, it is necessary, to increase either the rate, duration or intensity of the activity. Examples are increasing distance, decreasing time or increasing repetitions.
- 5) A. Gradually increasing the exertion. It takes time to develop fitness. Attempting too much too soon can be harmful. Begin a fitness program slowly — check with your doctor if you have been inactive for long. Each time you exercise, attempt to increase the workload for the activity.
- 6) C. The same as male divers. A diver should not dive if not feeling well; that goes for men and women. If a woman's period does not affect her severely or if her pregnancy is normal and healthy, she can probably dive. Doctor's approval is recommended. Women can be every bit as fit as male divers.
- 7) C. Every two years until age 40. A complete physical examination by a diving physician is recommended every two years. After age 40, a physical exam for diving should be obtained annually. More frequent exams are recommended if risk factors exist, such as hypertension or a family history of a medical problem.
- 8) C. Both of the above. A chest X ray could indicate a bleb, cyst, some scar tissue or other problem which could cause a lung rupture while diving. Get an X ray if you haven't already done so, and have another taken at least every two years. For optimum value, the X rays should be taken at full inspiration and full expiration with both front and side views.
- 9) B. Should be kept current by all divers. Divers are exposed to numerous possible diseases. Immunizations for typhoid diphtheria and especially tetanus should be kept current with booster shots. Include these inoculations in your diving physical examination.
- 10) A. Epilepsy. It may be possible for persons with diabetes, claustrophobia or other medical problems to dive with a doctor's assistance but not epileptics. Any medical problem which alters one physically or mentally should be resolved with a diving physician before engaging in diving.
- 11) C. Should always be avoided. Even if you think you're able to equalize well enough to dive, don't dive until completely recovered. Your entire system is weak and different than normal. Severe pain and damage can occur on descent or ascent. The use of drugs is dangerous. If you don't feel completely fit, don't dive.
- 12) C. Both of the above. Fitness is a mental condition as well as a physical one. Respiration, circulation and muscles can be at peak condition, but if the body is not well fueled and rested, with a relaxed, confident mental attitude, the diver is not fit for a dive.
- 13) C. With a doctor's approval and when effects are known. Little is known of the effects of drugs under pressure and even less about the effects of drugs in combination. Unconsciousness can result. If you need a drug to dive, you probably should not dive. Any drug should be tested for side effects on land before use during a dive. Remember, alcohol is also a drug, and should be avoided before diving.
- 14) A. One week of inactivity. It takes quite awhile to develop fitness for an activity, but efficiency deteriorates rapidly with inactivity. It is easy to maintain a level of fitness if you will exercise in the activity on a regular basis.
- 15) C. Exhaustion. Fitness leads to efficient, effective performance of a particular activity. This produces confidence to prevent panic, increases strength to cope with problems, but most importantly, the efficiency conserves energy and prevents exhaustion. A diver in physical control of a situation will also very likely have mental control of the situation.

What is your fitness IQ? If you missed more than three questions, you need to learn more about fitness and conditioning for diving. What is your fitness level? Can you swim 800 yards in a pool with mask, snorkel and fins in less than 15 minutes? Do you have a regular program to increase your level of fitness? The more fit you can become, the better you will feel and the safer you will be as a diver. Be fit and be safe.



FARALLON'S PRISMATIC MASK

AN EXCLUSIVE SDM PRODUCT REPORT

By Nancy Ackerman

Farallon specifically designed their new Prismatic Mask™ with a unique combination of four features: lightweight, low volume, perpendicular viewing planes and push button mask strap adjustments. Some of these features can be found on other masks, but the Prismatic™ wraparound mask has combined these four with several other important ingredients and has come up with a mask that proves to be a welcome innovation to the field of dive masks.

There are basically two types of masks made for underwater use. Those masks are: low volume masks for snorkeling or free diving; and higher volume, wider angle masks for scuba diving.

The close fit construction of the Prismatic Mask™ allows it to combine both desirable features of low displacement volume and wider field of vision. This minimal amount of air space facilitates purging and negates any need for the purge valve; and besides the obvious safety advantage of panorama vision masks, the Prismatic™ is a pleasure to use. I don't remember ever having a mask that I can see so well with that is so convenient to use! I calculated approximately 150° of visibility with this mask.

Enhancing visibility by decreasing distortion are the Prismatic Mask's™ perpendicular viewing planes' function. Of course as with all wide angle, three panel masks, there is some degree of distortion at the corner of the mask where the two planes converge. But, remember, the sides of masks are used mainly for peripheral vision.

The high impact frame of this mask is made of Cyclocac®, a lightweight, sturdy material used so often today in the dive industry. The soft, double seal, feather edge skirt and contoured, easy grip

nosepiece is made of a non-allergenic neoprene compound. Having had several skin reactions from masks I welcome the interest in the non-allergenic compounds; the soft nose pocket should be of interest to many who rely on pinching their nose for ear and sinus equalization.

The glass in the mask is all tempered, the front pane being 4mm thick and both sides 3mm. This means the lenses are highly impact resistant safety glass. And glass was used, of course, instead of plastic because of the better quality of vision allowed through this medium. Plastic scratches rather easily, and, although there may be some fogging of a glass faceplate, plastic is much more susceptible to condensation. Tempered glass also means that correctional lenses may be placed inside Farallon's mask and glued on.

The mask strap is another well thought out feature. It has a non-slip, split head band with push button Mask-Loks™ that make the strap fully adjustable. The mask is tightened by simply pulling the end of the strap through the Mask-Lok™; to loosen the mask, depress the ribbed end of the Mask-Lok™ and let out the strap as much as you need to. Most masks can only be adjusted topside before entering the water. But once you jump in the water, your mask had better fit! The Prismatic Mask™ not only can be adjusted in the water, the strap should be made wet to allow for easier adjustment. With the Mask-Loks™, the decision to wear or not to wear your hood does not also carry with it the burden of a cumbersome strap adjustment.

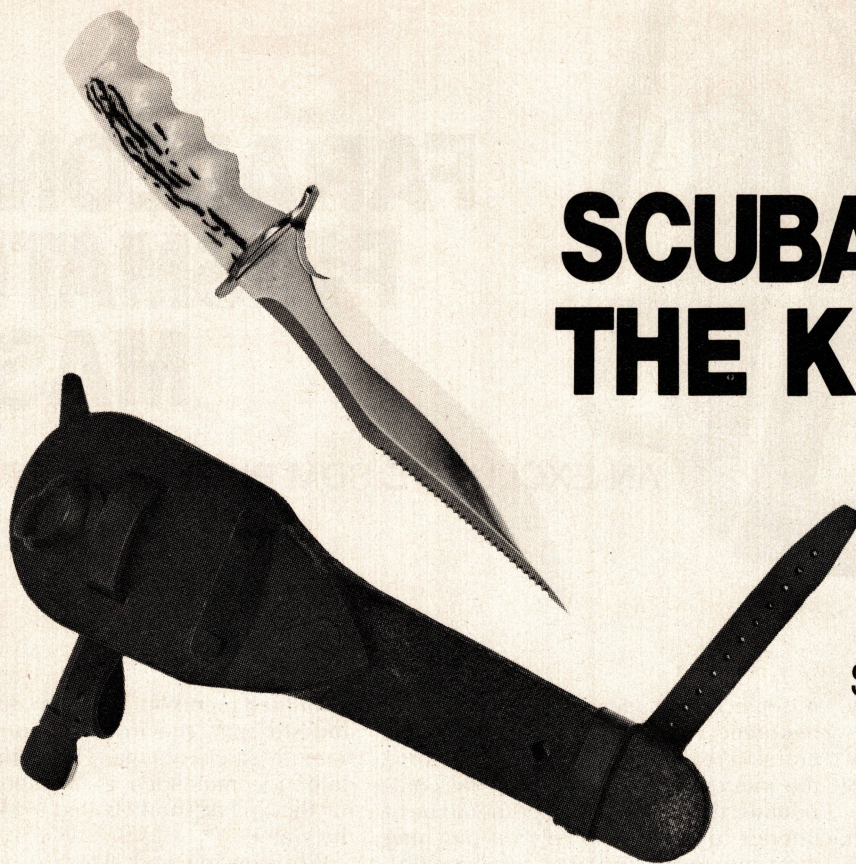
Last in the list of optional features, we should mention the overall aesthetic appearance of the mask. While the major portion of the mask is black, the best

color used for rubber goods for durability and strength, the front portion of the frame is safety orange. This is the same color recommended as a safety factor for the tips of snorkels that stick out of the water.

While shape and size are both optional features — the result of personal choice — the features that must be considered mandatory in a mask are comfort and airtight seal. You may choose a mask for certain particular characteristics, but your final choice must be predicated on fit. Its shape, size, comfort and ability to conform to your face and achieve an airtight seal is all important.

Since facial contours vary incredibly among individuals, this means that every mask cannot possibly fit every face. Or does it? While Jack McKenney and I enjoyed the soft, glove fit of the Prismatic Mask™, Paul Tzimoulis couldn't wear it. Paul couldn't wear it, that is, until the neoprene inserts Farallon included in the customizer kit were placed in the flange pockets adjacent to the Mask-Loks™. The inserts are kept in place with wet suit cement and, Presto! The mask fits Paul. This minor adjustment, simple as it sounds, moves the edges of the mask skirt in almost an inch.

Farallon's Prismatic Mask™ sells for \$29.95. This means that it sells for more than most masks made today for sport diving. But it also offers many features — all in one mask — that you may want to consider the Prismatic Mask™. Farallon has successfully designed this mask both minimizing air space and allowing a maximum field of vision. Go down to your local professional dive shop and see for yourself. Maybe you can even try it on in their pool. Maybe you'll like it as much as I do. 🐠



SCUBAPRO'S THE KNIFE

SDM PRODUCT REVIEW
By Nancy Ackerman

Scubapro has introduced one of the best looking knives to date to the dive industry. THE Knife, as it has been named, has a stainless steel blade and simulated stag horn handle. It also boasts three cutting edges to serve three completely different functions.

THE Knife is actually available with either a 431, magnetic, stainless steel blade or a 316, non-magnetic, stainless steel blade. The former, referred to as the magnetic model, is made for general use in sport diving and heat treated to 400 to 420 Brinell hardness. Brinell is simply a method of measuring the hardness of a metal and the head of a standard hammer would also measure out to approximately 400 Brinell hardness. The latter or non-magnetic knife is treated to a lesser 140 to 160 Brinell and devised mainly for military purposes possible for use near sensitive compasses or perhaps explosives. The magnetic knife holds a better edge, longer, while the non-magnetic knife is slightly more corrosion resistant. The guard and hilt on both knives between the blade and handle are both also made of 316 stainless steel.

The three cutting edges are individually useful for these three functions: cutting, paring and sawing or scraping. The cutting edge is recommended for cutting fish, kelp, bread, cheese and the like. The paring edge is for preparing food. Di-

rectly across from this blade is a notch designed for gripping with the forefinger to effectively control the blade for paring, allowing the thumb to be free for guiding the material being cut. The serrated edge is for sawing or scraping.

The contoured handle has a simulated stag horn finish. This grip is made of ABS plastic — a high strength, high impact material also utilized so often today also for its corrosion resistant properties.

The knife's sheath has a raised pattern on its rubber exterior. The inside of the sheath has several protrusions molded in it which holds the knife very securely. While the rubber loop must be used, this holds THE Knife more positively than most sheaths observed by the SDM editorial staff.

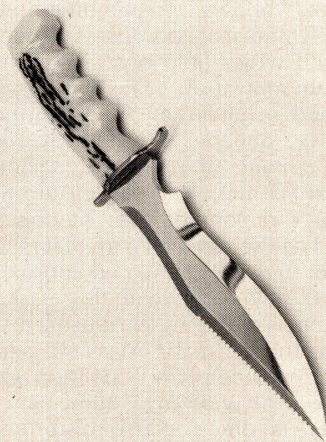
Each impressive knife is stamped on the blade portion with its singular serial number. This number is utilized, not only for identification, but also for warranty purposes. THE Knife carries a full two year guarantee against defects in materials and workmanship.

Each knife and rubber sheath may be purchased separately. The price of the magnetic knife with its sheath is \$30; the non-magnetic knife with sheath is \$35.

If you are one of those divers whose knife I've been so fortunate to find on the ocean floor, this knife isn't for you. Like most dive knives on the market today, it

has a means of keeping it in the sheath, a rubber guard that loops over the handle. But carelessness could mean the loss of this knife, too, to a diver too lazy to check and see if the knife is secure in its sheath.

And what an addition to my collection this knife would be! THE Knife serves several practical purposes, is made of



photography by PPC staff photographer Mike Perris

highly desirable materials, and manages, at the same time, to be very good looking. Go check one out at your local dive store. Maybe you'll decide to replace your old knife and treat yourself with THE Knife. >>>

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California

Underwater Exposition '76

Anaheim Convention Center April 3



photography by Jack McKenney

This year's California Underwater Exposition will be the biggest and best ever.

The evening show boasts three premier films never before screened at an underwater film festival in the U.S.

The lead premier film will be a completely new production by Jack McKenney, entitled *Things That Go Bump in the Night*. This new film is an imaginative, beautifully filmed, entertaining piece that depicts night diving at its very best. Filmed on the popular shipwreck,

Balboa, in Georgetown harbor at Grand Cayman Island, B.W.I., it presents many of the nocturnal animals, not generally seen during the daylight hours.

The second premier showing is Rick Frehsee's *March of the Spiny Lobster*. This unusual documentary depicts the incredible spiny lobster migration underwater, as these strange crustacea march single file across the great Bahama Banks.

And, last but not least, there will be a

premier of a film depicting the intensely dramatic underwater salvaging from a Japanese submarine lost during World War II. This film, by world renown cinematographer, Al Giddings, shows a professional team of Japanese salvage divers extracting the bones of their war dead. The audience will have a firsthand view of how such an operation is conducted, including the incredible problems working inside a small, cramped war vessel lying in 160 feet of water.

Jim Dutcher will present his finest environmental documentary, *Drop by Drop to the Sea*, for the ecology minded diver. This sensitive, poetic film traces the course of life-giving water from rainfall on land to its final destination in the sea. This film has already won the Cine Golden Eagle Award.

The evening show begins at 7:30 p.m. and include several other film surprises. It will end approximately at 10 p.m.

There will be an all California afternoon show starting at 2:30 p.m. This show will include such topics as: diving with Pacific coast sharks, kelp forests of Catalina, playful seals of Coronado, and a dive guide to the Channel Islands.

Running all during this time, from 1:00 p.m. on, before, in between and after these shows will be over 35 exhibits of new dive gear and underwater products, and saltwater aquariums and fish. One of the highlights of the exhibits will be a much enlarged exhibit of artifacts found along the California coast by the California Wreck Divers.

The price for the above afternoon and evening shows, including admission into the exhibit area, is \$7 at the box office or \$6 for advanced ticket sales. Tickets are available now at your local dive shop or by sending a check or money order to California Underwater Expositions, P.O. Box 10931, Santa Ana, California 92711.

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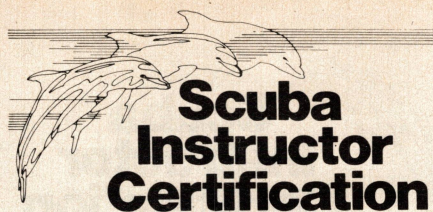
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Scuba Instructor Certification

(Continued from Page 20)

- June
NAUI Instructor Training Course, San Diego. (Contact: Mark Flahan, 2971 Mt. Gaywas, San Diego, CA 92117)
- June 5-6, 12-13, 19-20, 26-27
PADI Instructor Training Course, St. Louis, MO. (Contact: Michael Ster, Maramec Community College, 1145 W. 8th Ave., Marion, IA 52302)
- June 5-6, 12-13, 19-20, 26-27
PADI Instructor Training Course, Santa Monica. (Contact: Syd Albright, 848 Lincoln Blvd., Santa Monica, CA 90403)
- June 5-13
PADI Instructor Training Course, University of Las Vegas. (Contact: Ray Bailey, 5006 S. Maryland, Parkway Bldg. #19, Las Vegas, NV 89119)
- June 10-13, 24-27
PADI Instructor Training Course, Charleston, S.C. (Contact: Jerry Crosby, Rt. 1, Box 96, Pacolet, SC 29372)
- June 11-20
NAUI Instructor Training Course, San Diego, CA. (Contact: Mark Flahan, 4971 Mt. Gaywas, San Diego, CA 92117)
- June 12-19
NAUI Instructor Training Course, Youngstown. (Contact: Howard Ring, 3121 Davison Ave., Erie, PA 16504)
- June 13-20
PADI Instructor Training Course, Miami, FL. (Contact: Jesus Otero, 971 SW First St., Miami, FL 33125)
- June 14-June 20
PADI Instructor Training Course, Jacksonville, Fla. (Contact: PADI College, 4593 St. Johns Ave., Jacksonville, FL)
- June 19
PADI Instructor Training Course, Chicago. (Contact: Larry Douglas, 12003 S. Cicero, Alsip, IL 60658)
- June 21-Aug 29
PADI Instructor Training Course, Orange County, CA (Contact: Steve Metcalf, 504½ Fernleaf, Corona del Mar, CA)
- June 21-July 2
NAUI Instructor Training Course, Ann Arbor, MI. (Contact: Lee H. Somers, Univ. of Michigan, Space Research Bldg., #1216, Ann Arbor, MI)
- June 21-27
PADI Instructor Training Course, Jacksonville, Fla. (Contact: PADI College, 4593 St. Johns Ave., Jacksonville, FL)

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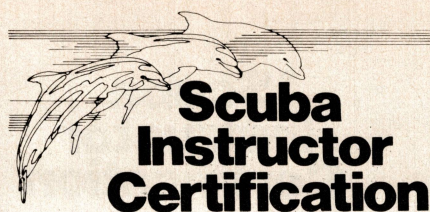
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PADI Instructor Training Course, Northern Michigan University. (Contact: George & Betty Tomasi, 455 E. Ridge, Marquette, MI 49855)

June 28-September 3

NASDS Instructional College, San Diego, Ca. (Contact: NASDS, P.O. Box 7666, Long Beach, CA 90807)

June 28-September 16

PDIC Instructor College, Monterey. (Contact: PDIC, 320 Hoffman, Monterey, CA 93940)

July

NAUI Instructor Training Course, Vancouver. (Contact: NAUI Canada, B.C., Box 510, Etobicoke, Ont., Canada)

July 5-September 10

PADI Instructor Training Course, Jacksonville, Fla. (Contact: PADI College, 4593 St. Johns Ave., Jacksonville, FL)

July 17

PADI Instructor Training Course, Chicago. (Contact: Larry Douglas, 12003 S. Cicero, Alsip, IL 60658)

July 23-31

NAUI Instructor Training Course, Peterborough, Ont. (Contact: NAUI, Box 510, Etobicoke, Ont., Canada)

August

PADI Instructor Training Course, Long Island, NY. (Contact: John Lovisolo, 3 Carol Dr., Bethpage, L.I. NY)

August

NAUI Instructor Training Course, Halifax, Ont. (Contact: NAUI Canada, Box 510, Etobicoke, Ont., Canada)

August 1-8

NAUI Instructor Training Course, Atherton, CA. (Contact: Martyn Perry, Menlo School & College, Menlo Park, CA 94025)

August 7

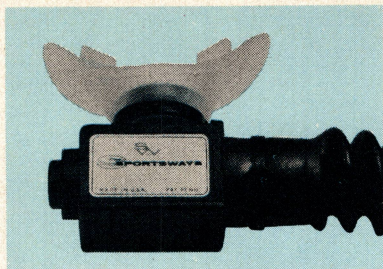
PADI Instructor Training Course, Chicago. (Contact: Larry Douglas, 12003 S. Cicero, Alsip, IL 60658)

August 7-15

NAUI Instructor Training Course, Charlotte, NC. (Contact: Ed Hipp, M.D., 1350 Kings Dr., Charlotte, NC 29207)

August 9-14

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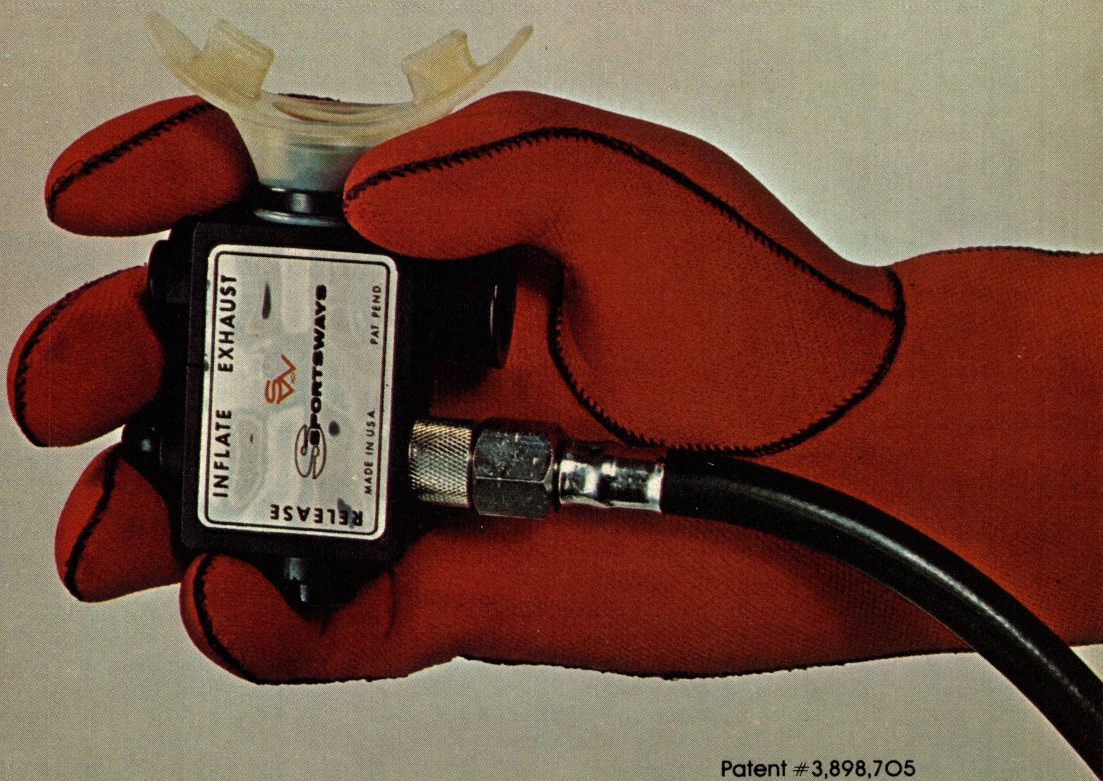
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MAN BENEATH THE SEA

By Bill Barada

Panama City, a small, tourist-oriented beach town in the Florida Panhandle, may be destined to become the hydro-space headquarters for America, and perhaps for the whole world. The key that is expected to unlock the magic door and attract a family of oceanographic and underwater research industries and institutions is the Naval Coastal Systems Laboratory (NCSL). This is a vast complex of interrelated research facilities that are quietly doing things underwater that sound a little like science fiction. But, the real excitement stems from the projects and facilities planned for the near future. These may very well rejuvenate the public and official interest in oceanography that got underwater research off to such high hopes in the 1960's — and died out in the 1970's to the point that federal funding has been virtually non-existent.

The NCSL may not be familiar to SKIN DIVER readers, but under different names, it shares part of the history and the success of the Navy's experiments in saturation diving. Apparently the Navy's top brass has had difficulty in deciding exactly what they wanted to call this facility. It was originally commissioned in 1945 as the Navy Countermeasures Station. In 1955 the name was changed to the Mine Defense Laboratory — and it was under this name that it helped build the old Sealab I habitat (SDM Nov. 1964). This was the Navy's first saturation dive in the open ocean, a totally new concept in diving, with problems and technology that had never before been faced. The habitat was put together on a shoestring budget, utilizing borrowed hardware, and technological breakthroughs were initiated as a matter of routine. The first crew of Navy aquanauts lived and worked in this habitat for 11 days in 193 feet of water off Bermuda.

The old Sealab I habitat is still being

used off Panama City ten years later. It rests on the bottom near a Texas tower type offshore research platform (very similar to offshore oil platforms) and is used as a test and training base. After all these years this habitat could still be utilized for saturation diving if necessary.

The Panama City lab also helped build the Sealab II habitat which put crews of both Navy and civilian aquanauts on the bottom in 200 feet of water off La Jolla, California (SDM Jan. 1966) — and the ill-fated Sealab III which was scheduled to put crews of divers on the bottom in 600 feet of water off San Clemente Island for 15 days. (SDM April 1969). Sealab III was cancelled after Barry Cannon was killed in an underwater accident.

The Mine Defense Laboratory became the Naval Ship and Development Laboratory — and finally, in February of 1972, it was established as the Naval Coastal Systems Laboratory, with its future inextricably linked with the underwater research and development.

The heart of the new complex is a massive Ocean Simulation Facility which is capable of testing both men and equipment to depths of 2500 feet. (SDM June 1972). This chamber not only can take men deeper than any other in the world, it has an amazing ability to simulate actual conditions in the open ocean. The chamber has a terrific size capacity. It is the world's largest wet pot with an inside length of 30 feet and a diameter of 15 feet. An additional 30 feet of length can be added if needed. A unique feature is that the wet chamber is horizontal and both ends open up, so a small submarine or similar heavy equipment can be inserted. The wet pot is big enough to fly a miniature sub inside. Thus, men, equipment and all components of a diving system can be tested as a functioning unit — not just individual parts and pieces. Another unique feature is that the wet pot

can be filled with virtually any kind of water — from fresh to highly saline — and from temperatures as cold as 29 degrees to as high as 90 degrees, and as clear or turbid as desired.

Arctic water temperatures cannot be utilized in other pressure chambers because of the stress on metals and other components which could fail under a combination of extreme cold and high pressures. The OSF is constructed according to nuclear submarine standards, and can safely duplicate Arctic diving conditions. This will let scientists find out if men and equipment can stand the cold and pressure before they are submerged under the ice cap. That's why it's called the Ocean Simulation Facility.

Also, some of the commercial diving companies working in off-shore oil are already pushing to 1500 and 2000 feet of depth. These dives in the open ocean are based on test dives in chambers under ideal conditions, utilizing warm, clear water, or no water at all, and many of the decompression tables are extrapolated from insufficient test data. Even the most advanced commercial diving companies will readily admit that they are on very thin ice when making working dives to these depths. But, the world needs oil, and if oil is found at 2000 feet or deeper, the petroleum companies are going after it. The diving companies must plan to put men at these depths whether they really are ready or not.

Commercial diving companies working in the offshore oil industry are utilizing the decompression, recompression and saturation tables originated by the Navy, and a large percentage of the divers and scientists are ex-Navy. These companies are now going beyond Navy-tested tables on their own initiative.

The Navy is also preparing to put men and equipment to extreme depths, but the pace will probably be slower than

that of commercial companies, and the test data will be more complete before releasing the technology and techniques for general use by the fleet. That is what Ocean Simulation Facility is all about.

The OSF is operated by the Navy Experimental Diving Unit (NEDU) under the command of LCDR Jack Ringelberg. The NEDU facilities in Washington D.C. had a depth limitation of 1000 feet and were restricted to water temperatures of around 70 degrees. The EDU unit was moved to Panama City in the fall of 1974 to take over operation of the OSF.

LCDR Ringelberg told me, "We are confident that the work we have done makes the fleet operational to 1000 feet with existing dive systems." He also said he does not visualize any dives being made in the new OSF that won't be in cold water. The idea is to simulate actual ocean conditions — and deep ocean water is cold, dark and often dirty.

Yet, LCDR Ringelberg told me that his schedule is to have divers to depths of 2500 feet in the open sea in the near future.

Ringelberg said that it will probably not be practical for commercial companies to set up complete tests with the OSF facility, and the Navy has priority. However, "piggy-back" projects and experiments, run in conjunction with scheduled Navy tests, should be very simple and probably very inexpensive for private companies and institutions. Thus, if the EDU had a dive scheduled to 1500 or 2000 feet, a commercial company could arrange to have their test ride along at the same depth and under the same conditions at very little extra cost.

The EDU welcomes divers and companies who are developing a new concept to come in and discuss it, or bring it in for advice and guidance. The diversity of experience and the sophisticated equipment available can often save a manufacturer many, many hours of development time by showing him where he is off the track, or perhaps trying to reinvent the wheel. Informal discussions of prototypes are considered confidential and no reports are published.

However, products and systems submitted for formal test and evaluation are another story. The Navy does not broadcast the results, but reports are public information. And the Navy tells it like it is.

Not only is the NEDU moving to Panama City, a brand new Experimental Diving Facility (EDF) is under construction, and other Navy diving units such as SEAL, UDT and EOD are assigned to the base to work out of the diving locker. However, the OSF and diving operations are only a small part of the total systems concept at Panama City.

The NCSL complex is far from being strictly a diving or underwater research

photography by Author



Above diver is being fitted for special cold water test. Unique dive system components are being tested at Naval Coastal Systems Laboratory in their Ocean Simulation Facility.

lab. It is military mission oriented, but there is virtually no aspect of the world ocean environment that does not affect naval operations. A few of its major research interests are: Coastal Technology, Naval Diving and Salvage Support, Inshore Warfare, Acoustic Countermeasures, Mine and Ordinance Countermeasures, and Amphibious Operations Support.

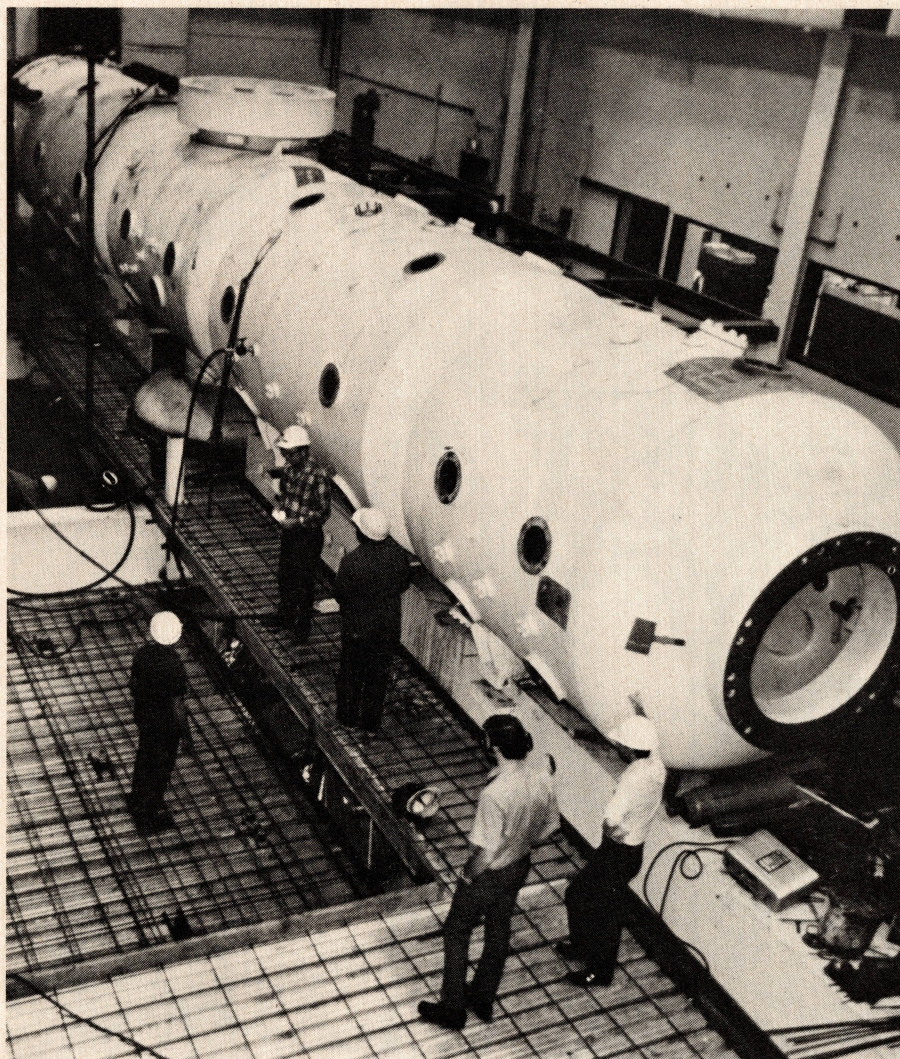
Virtually all of these have a need for divers and underwater technology, such as navigation, underwater acoustics, environmental studies and predictions, coastal defense and interdiction, swimmer defense, and coastal geodesy.

Diving and Salvage Support have sub-projects such as: Man-In-The-Sea, Swimmer Delivery Vehicles, Life Support Systems, Underwater Communica-

tions, Specialized Tools For The Diver, Navigations Systems, Human Performance Studies, and Large Object Salvage. Each of these subtitles covers a major ocean research project with spinoff benefits to many other areas.

NCSL employees are primarily civilian scientists, engineers and technicians. Virtually all are divers, most with saturation capabilities and experience, and many are former Sealab aquanauts. The regular Navy contingents, such as the EDU, are tenants of Lab facilities. As LCDR Jack Ringelberg put it, "We are the drivers who operate the Ocean Simulation Facility." Other Naval Units put the equipment and techniques developed by the Lab into practical service in the fleet.

Each project at the NCSL is more or less independent with a specific research



photograph by Robert Barth

The above wet chamber is the heart of the new Naval Coastal Systems Lab, a massive Ocean Simulation Facility capable of testing men and equipment to depths of 2500 feet in fresh or saline water, in temperatures from 29 to 90 degrees, in clear or turbid water.

objective. But they are all tied together into an overall ocean systems capability. And, although all projects are military mission oriented, there is a tremendous spin-off of benefits to both sport and commercial diving.

A few examples of things I saw and learned during a brief four day visit will give you some small idea of what NCSL projects may mean to diving's future.

1. I witnessed a demonstration by a private company of a new semi-closed circuit breathing apparatus that permits up to two hours on air at a depth of 300 feet. It is lightweight, compact and may be priced within range of sport divers.

It does not require much imagination to visualize what will happen to the incidence of bends if this unit becomes popular and begins to sell in quantity.

2. While I was on the base, a diver, Jim Middleton, spent eight hours in 34 de-

gree water and was perfectly comfortable. The suit-concept that kept him warm did not use electricity, hot water, or other extraneous heat. A suit with a dry air space delivered the insulation needed for prolonged ice water immersion. Could it be that we will come full circle back to some form of dry suit for extreme cold water protection?

3. Dr. George Bond, the "father" of saturation diving, told me he now has instruments which permit an instant analysis of the rate that different gases are absorbed and discharged in the blood and tissues of animals and humans.

Dr. Bond said that if this capability had been available 20 years ago it would have been possible to develop personalized decompression tables for each diver rather than an average for all divers which is what we are now using.

4. Members of the Diving and Salvage

Dept. introduced me to a whole new family of hydraulic power tools developed specifically for divers. Diver-engineer John Mittleman told me that about 98% of the underwater tools now in use by the fleet are pneumatic. These are popular because compressed air is almost always available while hydraulic power is not. However, pneumatic tools present staggering maintenance problems. Ten minutes bottom time usually means eight hours of cleaning to prepare a tool for storage (if it is ever to be used again).

Diver-engineer Marty Sheehan said the Lab solved the power problem by developing their own portable power unit which two men can easily handle. It is equipped with wheels so it can be moved from place to place on the deck of a ship. The NCSL now has a family of drills, wrenches, grinders, cable cutters, bolt cutters, pry bars and even a hot tap assembly, all of which are operated by hydraulic power.

Drills operate in the same manner as impact wrenches so the diver won't spin if the drill bit jams.

The hot tap is designed to bolt to a hull below water and connect a valve so the fluid from a tanker or a ship's bilge can be pumped out in case of an accident and thus reduce an oil spill. It is an adaptation of hot tap gear which offshore oil divers use to connect a valve to a live underwater pipeline without cutting off the flow of fluid.

Hydraulic tools developed by the NCSL can be used to scrub ship hulls underwater without drydocking. And the Lab is working on an underwater paint gun which divers can use to spray in the water after the hull is scrubbed clean.

The grinder has an abrasive cutting wheel that removes bolts, welds, zinc, cable and similar obstructions with amazing speed. A cable wrapped around a propeller that divers had been working on for eight hours was removed in 30 minutes. Salvage divers estimated the tool saved an additional eight or nine hours of work with hacksaws.

These tools will not only be available to ships of the Navy, they will be marketed commercially under private brand names. All items developed by the NCSL are public property (except those classified) because the Lab is supported by taxpayer's money.

5. A new push-pull breathing system is under development by the EDU which promises to virtually eliminate the effort of inhalation and exhalation while diving. In deep water, breathing gases are so dense that it requires almost all of a diver's energy just to inhale and exhale. Navy tests show that divers can out-breathe any apparatus now available,

even in shallow water.

The push-pull system pumps air from a Personnel Transfer Capsule (PTC) to the diver, then sucks it back through a separate hose. The PTC system scrubs the CO₂ and no helium is lost.

This system will not only permit divers to accomplish more work in less time, it will save a tremendous amount of money in lost helium. At 1000 feet a diver uses 60 to 70 cu. ft. of helium per minute, or about \$500 per hour worth of helium at 1974 prices.

6. The NCSL has developed sophisticated sonar gear that creates a visual picture of underwater objects inside a diver's face mask. With this equipment a diver can actually see objects in zero visibility water.

At the rate ocean pollution is accelerating this may soon be the only way that anybody can see underwater.

7. Helium voice communication, long a major problem in deep diving, can now be unscrambled and easily understood. This is a major breakthrough in underwater communication and should add greatly to diver safety and efficiency — plus rapidly accelerating the advancement of deep diving technology by aiding with topside coordination and understanding.

8. The NCSL's former Sealab aquanaut Wally Jenkins has written the first book ever published which describes the proper safety techniques and equipment required for Arctic diving. Jenkins is a veteran of numerous Arctic expeditions and said he was appalled to learn that this basic information was scattered among organizations and government agencies all over the world.

Jenkins spent several years researching the subject and has put it all together in a single publication. The book debunks a lot of prevailing beliefs of sport divers and some that have been published in scientific journals.

9. I was surprised to learn the extent and depth of the Navy's environmental projects. Apparently the federal government and the Pentagon brass are more concerned with ocean ecosystems than is generally believed.

The Navy is carrying out detailed studies throughout the world and oceanographic and environmental information is being accumulated and stored in a central, computerized data bank for instant retrieval. This information is not only oriented toward the effect

of the environment on military operations — the Navy is also vitally concerned about the effect of military installations and operations on the environment. In order to determine this effect, the Navy must first learn what the environmental conditions are before operations are initiated. These are baseline studies which are badly needed, and which do not now exist for any large area of the world ocean.

At the NCSL, my information on environmental studies came from oceanographer Walter Howard, research physicist George Dowling, and biologist George Brasswell. All are qualified saturation divers and Dowling is also a former Sealab aquanaut.

The Navy's computerized data bank of baseline environmental studies may provide the world with a badly needed global environmental information center, capable of monitoring the effects of ocean pollution, offshore oil drilling, undersea mining, military operations.

To my knowledge no other scientific or governmental organization is developing a similar capability. And this baseline information is basic to intelligent decision-making regarding the best use of, and the protection needed, for the world ocean.

10. The NCSL is working with the Florida University System and the National Oceanographic and Atmospheric Administration on an educational and training program called Scientist In The Sea (SITS). The concept of the program is to make sophisticated diving, scientific and technological equipment available to carefully selected graduate science students. In addition to the equipment, the students are exposed to what is prob-

ably the world's greatest concentration of underwater experience and knowledge. The course usually includes a saturation diving stint in the Bahamas.

The spark plug of SITS is former aquanaut Wilbur Eaton. His friends told me he is so devoted to the project Eaton has deliberately sacrificed opportunities for promotion in order to spend the time needed to direct its operations.

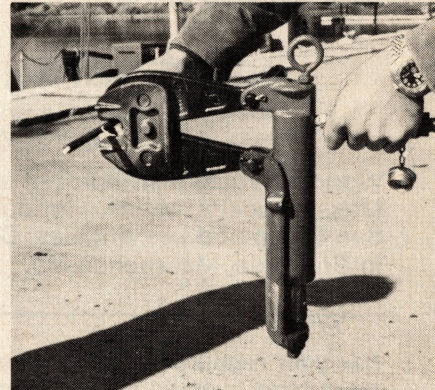
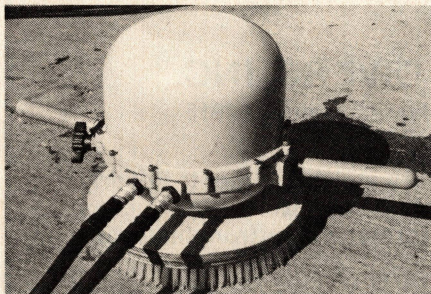
Few, if any, other programs anywhere in the world offer science students an opportunity to become familiar with such a diversity of advanced underwater equipment or to instructors with such wide ranging practical experience.

Unfortunately the Florida University System has not carried its full financial share of the program, and the entire project is in danger of being scuttled due to cutbacks in federal spending.

It appears to this writer that what is developing at Panama City and the NCSL is a systems wide approach to oceanographic problem solving similar to the approach taken in the formation of the National Atmospheric and Space Administration (NASA) for the conquest of outer space. The major difference between a systems approach, as compared to traditional methods of research and development, is that an entire system is studied as an interrelated entity instead of its individual parts and pieces. Isolated, uncoordinated studies produce fragmented results reminiscent of Aesop's fable of the blind mice which tried to describe an elephant by feeling parts of its anatomy. Each mouse was convinced that the whole elephant looked like the particular part it had felt.

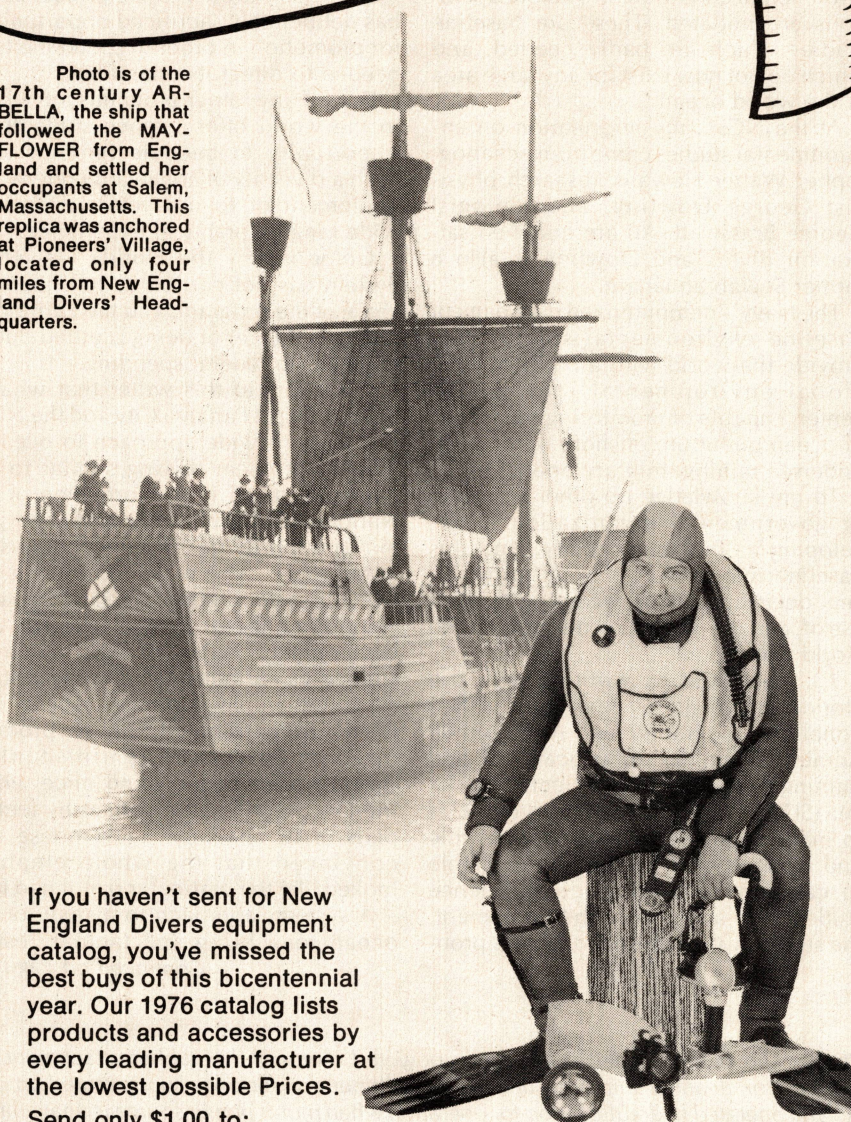
A systems approach to a study of the ocean may bring spectacular results
(Continued on Page 38)

Photograph below on left is hydraulic powered motor and scrubber attachment developed for cleaning ship hulls underwater without dry docking. Tool pictured on right is hand operated hydraulic pump for operation when motor power source is unavailable.



HAVE YOU MISSED THE BOAT?

Photo is of the 17th century AR-BELLA, the ship that followed the MAY-FLOWER from England and settled her occupants at Salem, Massachusetts. This replica was anchored at Pioneers' Village, located only four miles from New England Divers' Headquarters.



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Man Beneath The Sea

(Continued from Page 37)

similar to those achieved in outer space. The NCSL may presage a rebirth of national interest in oceanography, and it already is offering employment opportunities that could be a training ground for the future. Some quotes from the NCSL brochure give you an idea of what they have to offer. It says:

"The Naval Coastal Systems Laboratory offers the scientist, engineer, or technician who is interested in a rewarding career the opportunity to broaden his professional stature. Scientists and engineers of NCSL are afforded the opportunity to become familiar with the entire scope of a project from conception to completion and work closely with every phase of its development. The new employee, working with experts in his field, will become a member of a project team and, depending on capabilities, can rapidly attain a position of responsibility ..."

"Graduate level courses in science and engineering are offered at the Laboratory through the State University System ..."

"Special courses and classes are also offered from time to time in advancing techniques and state of the art in the technical, management and administrative areas."

NCSL experts in specific disciplines are often called on to visit remote parts of the world to act as observers, trouble shooters, or to train and teach personnel of foreign countries in the use of sophisticated underwater systems and techniques. For example, NCSL oceanographers Bill Tolbert and Charles Hodges were called in as trouble shooters when problems developed during clearing of the Suez Canal. An area of dead water was encountered which scattered sonar signals. Divers "bounced" off a lower layer and had to wear 30 to 40 pounds of extra weight before they could penetrate the dead water.

Tolbert and Hodges found the layer a salt-and-mud-soup which was loaded with poisonous sulphide gases. Their verdict, Navy divers were not to enter this water under any conditions. Other measures were recommended to solve the problem.

NCSL personnel were also called in during the clearing of mine fields from Haiphong Harbor after the war with North Vietnam.

Thus, the systems approach to understanding and utilization of the ocean, which is developing at the NCSL, shows promise of accelerating worldwide awareness that the oceans play a vital role in human survival. >

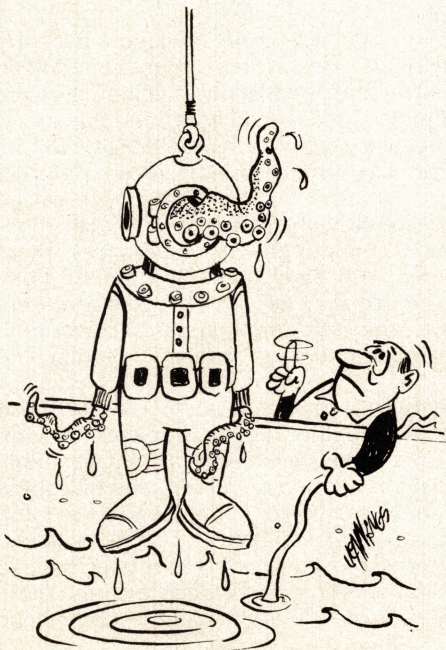
N.A.S.D.S. Great Northwest Dive-In

During a dealers meeting in September 1975 at Seattle, Washington, a group of Northwest, NASDS dealers decided to begin an event for all divers and their friends. They conceived a fun-filled, dive-in which is making history. They discussed this with their manufacturers who became enthused and joined in, to make it a reality.

The manufacturers and the NASDS dealers are now proud to present the Great Northwest Dive-In, April 23, 24, 25, 1976, at Victoria, B.C. Featured during the dive-in will be the Aquarius Film Exposition hosted by the humorous Dick Anderson. Divers certified according to NSTC standards and meeting equipment requirements may participate in The Great Northwest Treasure Hunt and would win first prize — one week diving in Honduras including air fare; second prize — one week diving in La Paz including air fare; third prize — one week diving in Ensenada. All divers must contact the participating stores for rules and regulations. Also drawing will be held for prizes given by the participating manufacturers. The professional manufacturers present during the dive-in, will be displaying their products. Tours, diving and charters will be available through the participating schools.

Saturday will be highlighted by a Bar-B-Que of salmon and shrimp, complete with logging competition and inter-store competition. The most professionally represented school will win a trophy which will be re-awarded yearly during this annual event.

For more information concerning The Great Northwest Dive-In, contact: Robert Quick, % Oregon Diving School, 525 Eggewater NW, Salem, Oregon.

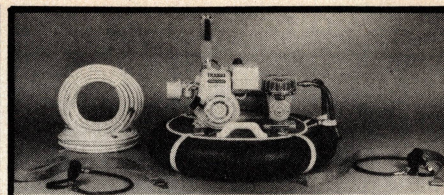


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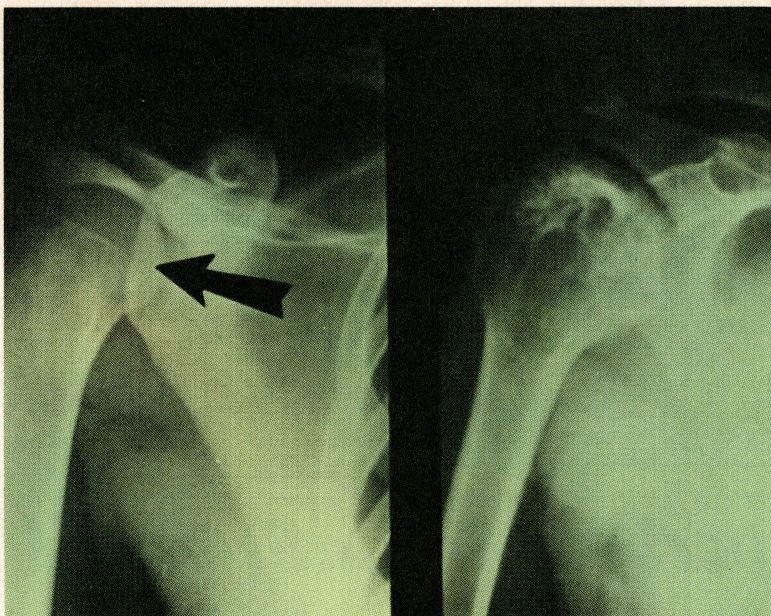
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The above X ray shows aseptic bone necrosis in the shoulder joint. Note the difference between the normal humeral head on the left and the dense, mottled head on the right involving aseptic bone necrosis.

ASEPTIC BONE NECROSIS

A Potential Sport Diving Medical Problem

by W. R. Hutchinson, M.D.

Today's divers are generally aware of the early or acute manifestations of the bends. These can include fatigue, itching, rash, joint pain, respiratory difficulty, or various neurologic symptoms.

However, the bends can also have delayed or long term consequences, and these generally fall into two categories: (1) A bend case presenting with neurologic symptoms may leave the victim with permanent residual neurologic defects such as varying degrees of paralysis, weakness, loss of bladder and/or bowel control, etc. Usually, these neurologic symptoms are most apparent within a few hours to a day or two after the appearance of bend symptoms, and varying degrees of improvement may then eventually occur. (2) Another long term consequence of bends is arthritis related to aseptic bone necrosis. Here, the victim may fully recover from the initial bend episode, enjoy an asymptomatic period lasting six months to several years, and then gradually develop arthritis in one or more joints which generally worsens as time passes.

The basis for this second phenomena lies in the structure of bone. Bone, a highly complex structure, is composed of living cells involved in a variety of functions. Dead bone is considerably weaker than living bone. The exact mechanism by which bone death is induced by the bends is unknown. However, it is generally felt that the bubbles associated with the bends complex significantly impairs blood supply to local areas of bone which can result in bone death. If the local area of bone death occurs in the shaft of a bone, there is usually enough surrounding healthy bone to provide adequate support. Here, aseptic bone necrosis will be asymptomatic and probably undiscovered unless accidentally noticed on an X ray obtained for some unrelated medical problem. However, if the area of bone death occurs on a joint surface, the weak area of dead bone will eventually collapse. This produces pain and limitation of motion in the afflicted joint. New bone regeneration in the collapsed dead area of bone is poor or nonexistent, and thus, the prognosis for any improvement is generally poor. The time interval from the initial bend episode to the onset of symptoms is approximately six to 36 months.

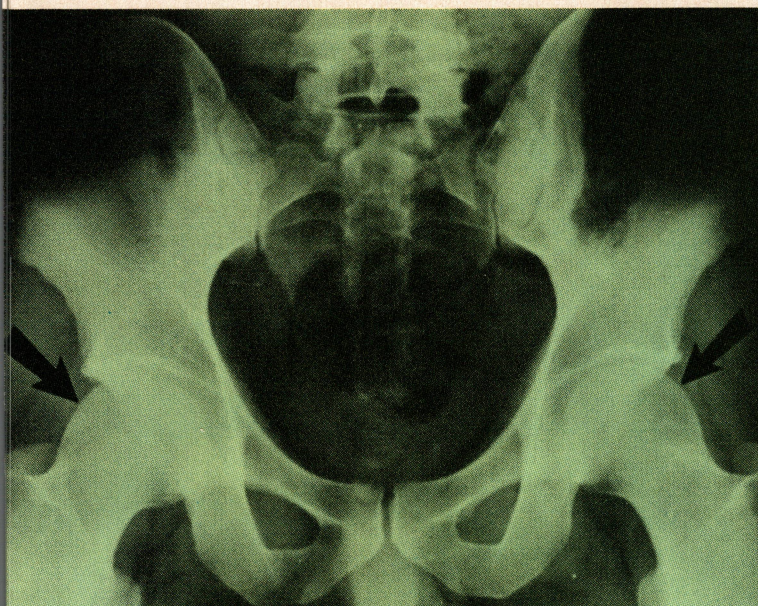
With the preceding description, the imposing term aseptic bone necrosis loses some of its mystery. Aseptic simply implies without infection and necrosis is a medical term for death of a tissue. The term bone infarction is used interchangeably with aseptic bone necrosis. Infarction is the death of a tissue from insufficient blood supply.

Any condition that has the potential for impairing blood supply to a local area of bone may cause aseptic bone necrosis. For example, significant vascular injury may occur with a traumatic dislocation or bone fracture. This in turn could lead to aseptic bone necrosis. Some nontraumatic medical conditions in which there is presumed occlusion of tiny arteries include sickle cell anemia, arteriosclerosis, some types of cortisone therapy, and lupus erythematosus. A significant percentage of aseptic bone necrosis (especially the hip) are idiopathic. Idiopathic implies that the cause is unknown or poorly understood. Interestingly, in the so called idiopathic category, a large number of victims are alcoholics.

In regards to bend related aseptic bone necrosis, only two bones are commonly involved. These are the upper arm bone (humerus) and thigh bone (femur). Generally, the area of involvement is the upper or lower shaft of the femur, upper shaft of the humerus, head of the femur (hip joint), head of the humerus (shoulder joint), and less commonly, the femoral condyles (knee joint). Occasionally, a third bone can be involved — the shin bone (tibia) with the upper shaft being the usual site of involvement.

The diagnosis is best made by X ray examination, but early diagnosis may be difficult or sometimes impossible. When bone infarction involves the bone shaft, calcium salts are gradually deposited in the area of dead bone, and this shows on the X ray as an irregular area of increased density. But, to further complicate the diagnostic problems, an area of shaft aseptic bone necrosis (or bone infarction) may present an identical X ray appearance with a variety of benign (non-malignant) bone tumors or minor growth disturbances. The X ray changes associated with early or limited aseptic bone necrosis of a joint surface may be non-detectable or very subtle. As the disease progresses, the findings become more obvious as the joint surface assumes a flattened, irregular, and dense appearance.

As was indicated earlier, aseptic bone necrosis occurring in the shaft of the bone will usually cause no problems or symptoms. However, aseptic bone necrosis in a joint generally causes progressive pain, limitation of motion, and disability. These symptoms are most significant in the hip or knee joint, because weight bearing must inevitably occur in walking. Various surgically inserted prosthetic joints have been utilized in the treatment of this condition, particularly the hip. These have varied in their successes, but generally, no prosthetic



The X ray on the left shows a normal pelvis. Note the hip joints with arrows pointing toward each femoral head. The X ray on the right illustrates advanced aseptic bone necrosis involving the femoral head on the left, the right femoral head already having been replaced with a metal prosthesis. Note its flattened, irregular, dense appearance as compared to the X ray on the left.

joint approaches the original in range of motion or durability. Thus, at present, the best method of treatment is prevention.

Data regarding bend related aseptic bone necrosis comes from studies of a bend susceptible population. This population is generally divided into two groups — those who undergo high altitude decompression (aviators, astronauts, and low pressure chamber operators) and those who undergo hyperbaric decompression (caisson workers, divers, and hyperbaric chamber personnel).

An increased incidence of aseptic bone necrosis in caisson workers was discovered shortly after the turn of the century. Early reports involved single patients or a small number of patients involved in a variety of tunnel projects, and thus the reported incidence varied from 0-75%. Later tunnel projects have had more thorough ongoing medical evaluation. Some recent British tunnel projects have reported approximately 19-26% incidence of bone lesions in caisson workers. However, the percentage of victims disabled by their bone lesions is considerably less than this.

There is less medical literature dealing with aviators and hyperbaric chamber personnel. In general, the incidence of aseptic bone necrosis appears to be lower in this group than caisson workers.

Medical literature regarding aseptic bone necrosis in divers is more limited than that involving caisson workers. Like the early reports about caisson workers, the described incidence of diving related aseptic bone necrosis varies widely. Some diving populations have shown an incidence of greater than 60% although generally, the reported incidence is considerably less than this. In reviewing this, it becomes apparent that it is very difficult if not impossible to ascertain the risk of diving related aseptic bone necrosis. One of the statistical problems in diver studies is that, unlike caisson workers, a large population of divers rarely assemble for a project which requires an extended period of time. Secondly, the various diving populations that have been studied (mostly foreign) have shown great variation in diving procedures — depth, bottom time, decompression techniques, frequency, etc.

In most diving related cases of aseptic bone necrosis, the victim had suffered one or more cases of the bends often accompanied with delayed or inadequate treatment. However, aseptic bone necrosis has been reported in divers and caisson workers who apparently have never experienced bend symptoms. This phenomena is difficult to evaluate. Can an

individual undergo decompression, notice no symptoms, and still have bubble formation sufficient to cause aseptic bone necrosis? Or, is this statistical puzzle influenced by people who out of ignorance disregarded mild bend symptoms? It is also possible that individuals included in this group knowingly chose to ignore minor aches to avoid lengthy treatment. In commercial situations, treatment may involve lost time and pay from a job. Finally, since alcoholism has been associated with aseptic bone necrosis, what is the role of alcohol consumed in the immediate post decompression period?

In spite of limited data, it is suspected that aseptic bone necrosis involving United States divers is relatively rare. The U.S. Navy has a large number of long term divers who are subject to regular physical examinations and reports of aseptic bone necrosis have been virtually nonexistent. There is a very large population of sport divers in the U.S.A. So far, medical case reports of aseptic bone necrosis from this group have been extremely rare. The apparent higher incidence in caisson workers could be related to the relatively long bottom times and strenuous activity involved in this type of exposure.

Retrospective study has yet to indicate an ideal decompression procedure that would virtually eliminate this hazard. When one attempts to analyze the medical literature, the data leads into a statistical maze. Such as: (1) Many of the early reports of aseptic bone necrosis (in caisson workers) describe a single or small series of cases or have insufficient detail to identify causative factors. (2) Most professional divers and caisson workers lead thoroughly nomadic lives making long term follow up extremely difficult if not impossible. (3) In any individual case of aseptic bone necrosis, there are many variables which may have affected its appearance and outcome. Some are: age, total number of exposures, depth, bottom time, physical activity on the bottom, decompression procedures, repetitive dives, surface interval, bend severity, time interval prior to treatment, and type of treatment. (4) Finally, the fact that there are other causes besides the bends and occasional confusion in the X ray diagnosis, has already been mentioned.

Saturation diving is a new area of endeavor and the incidence of aseptic bone necrosis is unknown.

It would appear that the sport divers chance of acquiring disabling aseptic bone necrosis is very remote provided that (1) good conservative decompression practice is adhered to, and (2) bends are treated by prompt recompression and decompression by one of the standard treatment tables. 

THE INS AND OUTS



OF BUOYANCY COMPENSATORS

by Jack McKenney

The state of the art of sport scuba diving has evolved over the last few years to the point where the octopus regulator, the submersible pressure gauge and the buoyancy compensator are now considered to be standard pieces of equipment rather than just accessories.

They have evolved out of necessity. Diving accident researchers are finding out that the safest and best approach to sharing one's air supply is with an additional second stage octopus. The submersible pressure gauge, of course, allows a diver to constantly monitor his time underwater and effectively and safely plan his dive. From a safety standpoint, the BC is a container of air to support a weary diver at the surface. But equally important, it is a tool which allows that diver to adjust for neutral buoyancy underwater and also lift him upward through the water, if necessary.

If you're a relatively new diver, more than likely you already own a BC. Chances are good that your diving instructor did his job by pointing out the benefits of using one of these remarkable pieces of equipment as opposed to the old CO₂ emergency flotation vests. If he didn't, and you are currently using one of the latter pieces of gear, then he didn't do his job and you owe it to yourself to read on and find out why you should be using a BC. In the process, you'll learn some interesting facts.

TERMINOLOGY

First, let's get the definitions down pat:

Personal Flotation Device — Generically, all flotation systems that divers use can be grouped under this term.

Emergency flotation device — Emergency means the vest is designed to inflate by a one shot, expendable CO₂ cartridge in case of an emergency. Flotation means the vest is designed to operate on the surface and not at depth.

Buoyancy compensator — A BC is an inflatable ballast tool which a diver may use as a personal flotation device (operable at the surface and at depths to 200 feet or more) and as a system to control and trim his buoyancy while underwater. The word emergency has been eliminated because a BC can be used any time during a dive. It is a portable, flexi-

ble air ballast system which operates like the ballast system of a submarine.

UTILIZATION

Buoyancy control at depth — When a diver, wearing a wet suit descends, his suit compresses and he becomes heavier. The deeper he descends, the more his suit will be affected by the increasing water pressure. He must then exert more physical effort to prevent sinking. However, by admitting just enough air into his BC, the diver can offset his sinking and, once again, attain neutral buoyancy. Upon ascending, the air can be removed by holding the corrugated tube above his head and depressing the mouthpiece valve or by operating a special dump valve.

Surface use — After surfacing at the end of a dive, by cracking air into the BC via the mini cylinder or low pressure hose from the regulator, or by orally inflating the BC, the unit will aid a diver while swimming in keeping him afloat. He will arrive back at his base less fatigued. This can be done on every dive regardless of how many dives are made in one day. If the diver wants to descend again, he only has to deflate the vest and make his second dive.

Buoyancy ascent — The most impressive feature of a buoyancy compensator is its ability to inflate at depth — even at the 100 foot level. In the case of an extreme emergency, a diver can fully inflate a BC (in most cases, in less than nine seconds) and make a rapid ascent to the surface. While a speedy ascent lessens the possibility of drowning, it does increase the chances for an accidental air embolism or a case of the bends. The procedures for a rapid buoyancy ascent should be understood but not practiced.

The U.S. Navy Diving Manual prescribes a normal, safe rate of ascent as 60 feet per minute. The old rule of thumb is: "Don't pass your own bubbles during ascent". This rate of ascent can be easily controlled with most BC's by carefully regulating the amount of compressed air put into the jacket. As soon as lift begins, the air supply is shut off. As the diver rises toward the surface, the air trapped inside the jacket will expand, thus providing more buoyancy and increasing the rate

of ascent. The diver then regulates the speed of ascent by venting off excess air via the oral inflator valve or dump valve.

DESIGN PARAMETERS

Tests have shown that the best design for a personal flotation device to insure that a diver will have his head supported clear of the water, should he become

photography by Author

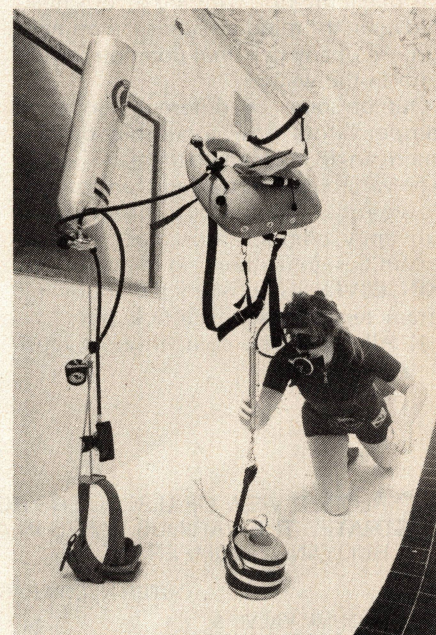


Illustration on opposite page shows a buoyancy compensator in all phases of operation with the diver's second finger injecting air (green arrows) into the BC to inflate it. His index finger pushes the exhaust button to eliminate air from the unit (blue arrows). The red arrows indicate air escaping via the overpressure relief valve. The latter takes place when there is an excess of air in the buoyancy compensator. The above photograph shows the reading off of the actual pounds of lift of a fully inflated BC during the water testing.

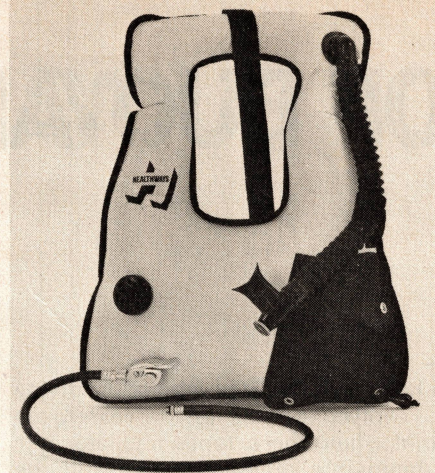
unconscious, is the doughnut or horse-collar shape. The bulk of the bag should be in front of his chest and upper stomach and the portion going around



AMF SWIMASTER
3-D B.C. #8BC1



DACOR
Seachute Vest BC-1



HEALTHWAYS
Scubamaster B.C. #1989

the back of the neck should also be capable of being filled with air. In effect, it acts like a life ring with the diver's head held up in the middle. This is the primary purpose of any personal flotation device worn in the water.

Out of some 26 different buoyancy compensators now available on the American diving market, there are bound to be variables in design and fabrication. However, the basic concept of a buoyancy compensator must include certain design features, so the editors of SKIN DIVER established the following parameters to base this article on:

- 1) All buoyancy compensators must

be able to support a diver at the surface with his head clear of the water. Each BC must fit over the head around the back of the neck, doughnut or horseshollar style.

- 2) All must be capable of being orally inflated.
- 3) All must be mechanically inflatable, either by an attached refillable air tank, or by way of a low pressure hose off the main scuba system.
- 4) Each unit must have an overpressure relief valve. See the chart on page 47 which depicts 11 models of BC's chosen by SKIN DIVER to report on.

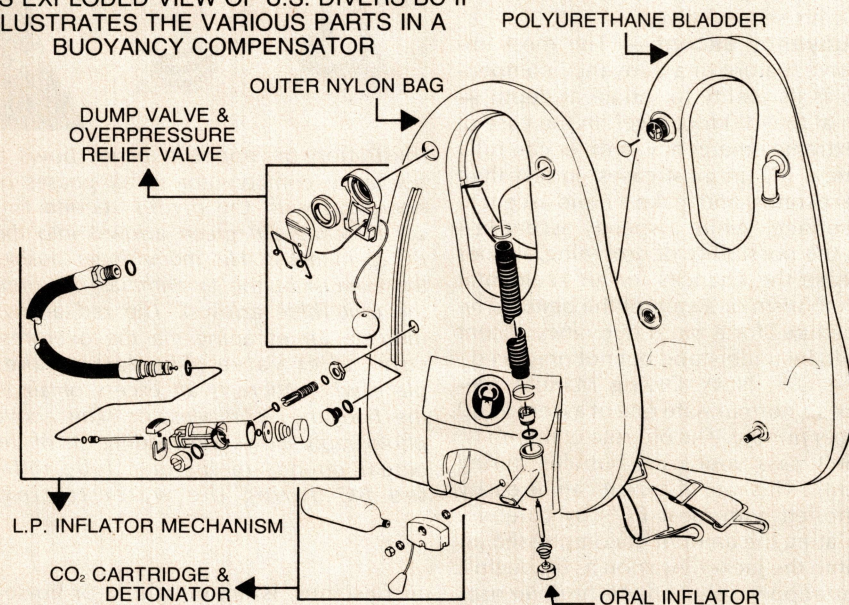
THE MECHANICS

Basically, buoyancy compensators can be divided into two types: one that utilizes a separate refillable compressed air cylinder and one that uses air from the diver's scuba tank via a low pressure hose that connects into the first stage of a regulator. There are pros and cons to using either system; and the issues about which type is superior will be debated by divers and instructors until everyone is blue in the face, with nothing definite being concluded. We'll just present the facts here and let you decide which type would work best for you.

Low pressure hose connector — Of the 11 BC's from nine different diving equipment manufacturers, ten of them utilize a low pressure hose that connects into the first stage of the diver's regulator. As long as there is air in his scuba tank, the diver will be able to inject air into the bag. If he were to run completely out of air at depth and unable to breathe from his scuba, then he also wouldn't be able to fill his BC. However, it should be noted that even if there is not enough air to allow the diver a full breath, there may be enough to inject into the vest to provide lift. And, as the diver rises in the water, the air inside his BC will expand, providing additional lift.

Of the ten vests in this report that utilize a low pressure inflator hose, seven of them connect into a special, valved mouthpiece unit which attaches to the corrugated oral inflation hose. All of these hoses feature a quick disconnect coupling at the mouthpiece position. The LP hose screws into a low pressure port on the first stage of a regulator and remains there so one of the last things to check prior to hitting the water is to be sure the LP hose is connected into the BC. Basically, all of these connectors feature two buttons on the mouthpiece mechanism — one is an inlet that, when pushed, allows air to flow into the vest;

THIS EXPLODED VIEW OF U.S. DIVERS BC II ILLUSTRATES THE VARIOUS PARTS IN A BUOYANCY COMPENSATOR





SCUBAPRO
B.C. #558



SEAQUEST
Fenzy



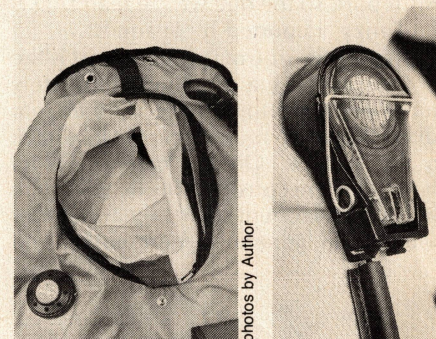
SEAQUEST
M-90

and the other is an exhaust button that, when depressed with the hose extended over the head allows the air to flow out of the vest via the mouthpiece. All of these LP hoses are designed to come over the left shoulder.

The other three vests — from Seatec, U.S. Divers and Healthways — feature two other types of LP inflator hoses. Healthways and Seatec's BC 301 is of the thumb lever valve type and U.S. Divers has a push button design. All three of these feature only an inlet button, or lever. Healthways' and Seatec's are purged by holding the oral inflation hose over the head and depressing the ex-

haust button on the mouthpiece. U.S. Divers' has a dump valve located in the position of the top of the right shoulder with a cord running down to the right front part of the vest. The cord is pulled to open the valve and is an efficient, easy method of dumping the air fast from the vest. On these three vests, the LP hose comes off to the right side and up under the right armpit to the regulator.

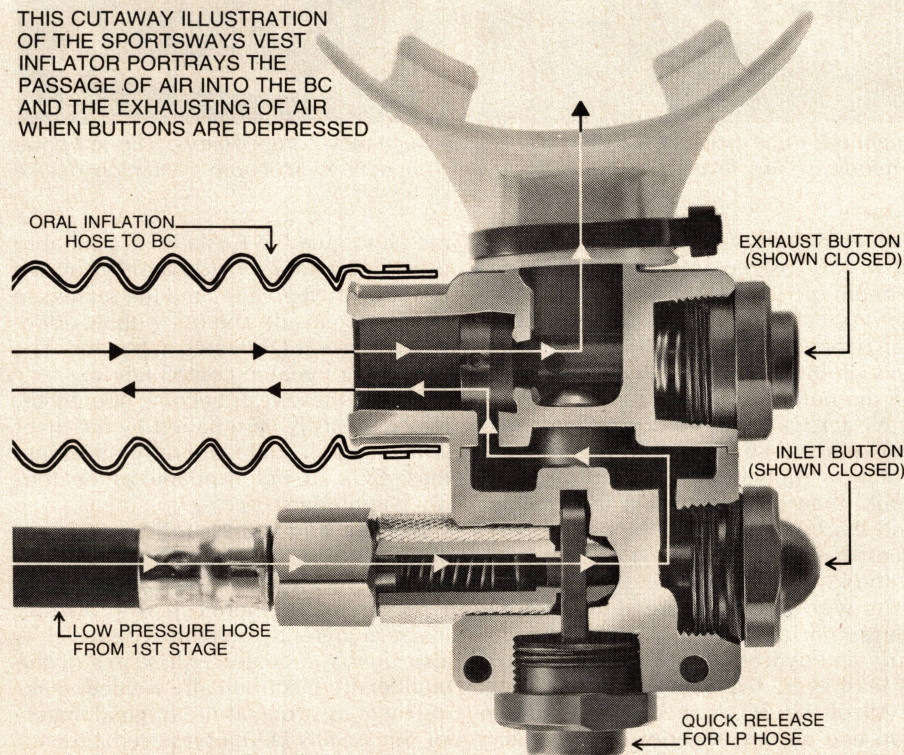
Something to be aware of when purchasing a low pressure hose BC: Does the vest you have in mind have the hose coming off the same side to match with the LP inlet on the first stage of your regulator? If it is designed for use on the



photos by Author

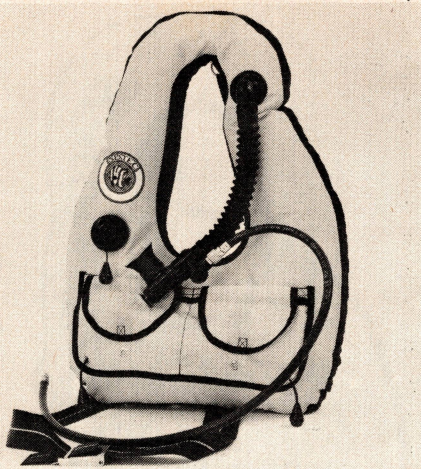
Above photograph on left shows Dacor's double bladder construction inside the outer nylon bag. On the right is U.S. Diver's unique dump and overpressure relief valve, located on the upper right portion of their buoyancy compensator.

THIS CUTAWAY ILLUSTRATION OF THE SPORTSWAYS VEST INFLATOR PORTRAYS THE PASSAGE OF AIR INTO THE BC AND THE EXHAUSTING OF AIR WHEN BUTTONS ARE DEPRESSED



opposite side, it means that the hose will twist back and under between the top part of the tank and back pack to get around to the other side. If you are a big person, this could create a problem because the hose might not be long enough to take this extra turn. As you can see from the chart, the hoses vary in length from 27¼" to 39". But you can't effectively select a BC with this information either because not all of the oral inflation tubes where the LP hose connects into the mouthpiece are the same length. It is best to screw the LP hose into the regulator first stage, attach the regulator to a tank, put everything on and snap the hose into place. Only by trying it on will you be able to determine that it fits comfortably. Be aware that some regulators have their additional low pressure ports coming off the left side, some off the right side and even some coming straight down. Don't get caught short. It's possible to order extra long hoses from some of the diving equipment manufacturers.

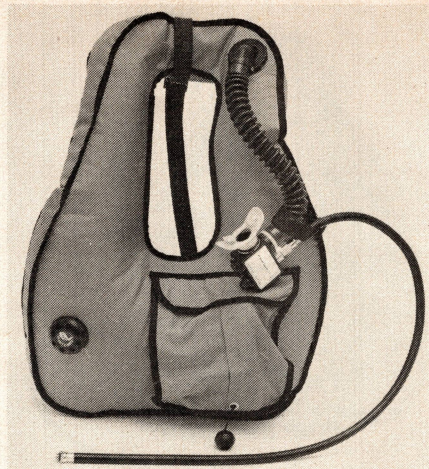
High pressure bottle — Three BC's on the American market feature their own mini compressed air bottle. U.S. Divers and U.S. Nemrod didn't have theirs



SEATEC
BC-V



SEATEC
BB 301



SPORTSWAYS
Deluxe Waterlung BC Vest #1860

available at the time we were working on this report, so the one we are featuring is the Fenzy, imported by Seaquest.

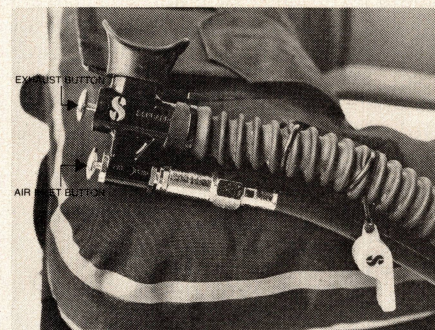
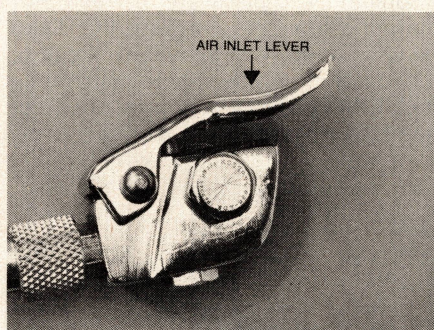
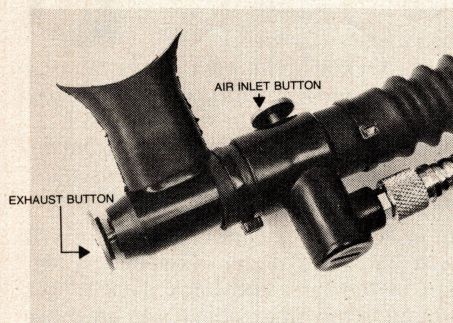
On the plus side of the bottle vest is the fact that, even if a diver ran completely out of air at depth, he would be able to fill his BC with enough air to get him back to the surface. On the negative side, these units are considerably heavier than their LP hose counterparts by about four pounds and, generally, more bulky. And

lates as follows: 200 BAR is 2900 psi and, at 2900 psi, the bottle holds 2.74 cu. ft. of air. With a working pressure of 2300 psi, the bottle holds 2.17 cu. ft. of air. 300 BAR is the test pressure; 5.75 is the date the bottle was manufactured and OL395 is the serial number.

To determine exactly how effective this type of BC system is, Tommy Thompson, Special Projects Director and Diving Safety Officer of Commercial Diving

Single bag construction — These BC's are generally constructed of a nylon fabric that has been coated with neoprene or a urethane. Seatec's is manufactured of a number 420 denier (that's the size of the yarn) nylon that has been coated with a special urethane to allow for electronically welding the edges.

White Stag's Buoyansator VII is a neoprene coated 100% nylon pack cloth also woven of 420 denier yarn. The bags



In the above photographs are shown left to right the three types of inflation devices on buoyancy compensators. The left photo shows a popular version; the photo in the middle shows lever type inflation device; on right is Scubapro's inflation device.

while a diver will be able to check his tank air pressure by way of a submersible pressure gauge to determine how much air he has, he can't check a BC bottle without actually going through the filling process. This sometimes leads to carelessness, especially when a diver is in a hurry to get back into the water and, oftentimes, he may forget to fill the mini tank. However, in conversations with a couple of professionals, for deep working dives, the bottle BC is preferred because of its independent air supply.

Seaquest's Fenzy is manufactured in France and was one of the first BC's introduced to the American market back in 1968. Around the neck of the mini air cylinder are markings that will be foreign to most American divers — 5.75 PE 300 BAR 2S 200 BAR OL395. This European BAR method of measuring pressure trans-

Center in Wilmington, filled a Fenzy bottle to 2500 psi, got into a chamber and at a depth of 150 feet, turned on the cylinder. At that depth, he was able to fill the Fenzy bag three-quarters full — certainly enough to lift a properly weighted diver off the bottom.

As a back-up system, a diver could also attach a LP inflator hose to the oral inflation tube of the Fenzy. The vest could then be operated in this manner and the bottle reserved as a spare. Seaquest has a LP inflator system available with either a 22" hose or a 33" hose.

As with any high pressure cylinder, these mini tanks should be VIP'd regularly and hydrostatically pressure tested at least every five years.

All of the BC's can be broken down into two more categories — single bag and double bag construction.

are hand glued in Costa Rica. Scubapro uses a 420 denier nylon, coated on the inside with neoprene, and the seams are taped both inside and out with an adhesive where it is fabricated in Mexico. The Fenzy is a hypalon coated fabric.

Should these vests become punctured, they can easily be repaired by the diver with a patch kit. Generally speaking, these BC's are not as pliable as the double bag models.

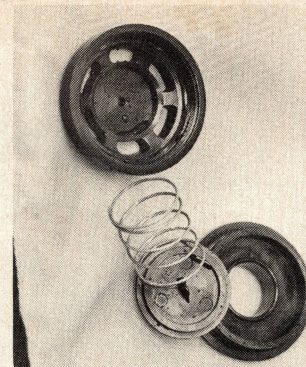
Double bag construction — Seven of the 11 BC's featured here utilize double bag construction. These BC's feature a polyurethane, thermo plastic bladder inside an outer nylon fabric bag which is also urethane coated. All seams of the bladder are electronically welded, making them as strong as the original material. Since SKIN DIVER presented a round-up report on BC's just about two years



U.S. DIVERS
B.C. II #7040-00



WHITE STAG
Buoyansator VII #53975



Most of the overpressure relief valves are made on a simple spring/valve method designed to break at from one to two psi. Above shows the simplicity of the relief valve.

ago, extensive testing and evaluating of this type of BC construction and materials have taken place out in the field.

Initially, there were a high percentage of returns after about eight months of use, especially where these BC's had been used in rentals. Because of moisture remaining inside the bladders, bacteria formed and, due to salt water, the plastic began to crystalize. Since then, the polyurethane has been upgraded sub-

stantially with some rather drastic chemical changes in the compounding of the urethane. Now, according to Harry Rusigno, president of Seatec, these new vests "thrive on neglect!" Claims Harry, "Neither bacteria, hydrocarbons, ultra violet rays, saltwater nor chlorines will affect this new material!"

Polyurethane is the most expensive plastic of its type. It's extremely tough and literally impossible to tear. And, be-

cause of the outer nylon bag, these polyurethane bladders are very difficult to puncture. In the event that the bladder did spring a leak, although the outer nylon bag is not airtight, enough air could possibly remain trapped in it to assist the diver to safety. Also, rather than having to patch the bladder, it can simply be replaced. Most of the bladder BC's feature a grommet at the top of the outer

(Continued on Page 82)

	L.P. Hose Inflator	Air Bottle Inflator	CO ₂ Inflator	Length in Inches	Width in Inches	Neck Opening in Inches	No. & Size Drain Holes Bottom of BC	3D or Flat Construction	Inner Bladder	Size of Opening — Over Pressure Relief Valve in Inches	Length of Oral Inflator Hose in Inches	Length of L.P. Hose in Inches	Pocket Size	Color	Price
AMF Swimaster 3-D B.C. #8BC1	Accessory #VIV \$45.00	None	Single 25 gm	25	19.5	5.75 x 8.75	Four .4375	3D	Yes	.75	17	28	Single 10.25 x 6.25	Orange	\$89.95
Dacor Seachute Vest BC-1	Accessory #VIS \$35.00	None	Single 25 gm	23	16	5.25 x 9	Four .25	3D	Yes (Double)	Two .8125	22	27.5	Double 5.5 x 6	Orange	\$113.00
Healthways Scubamaster B.C. #1989	Std. Equip.	None	Single 25 gm	25	18	5.5 x 8.25	Two .4375	Flat at Top 3D at Bottom	Yes	.8125	19	39	Single 6.5 x 7.75	Yellow	\$130.00
Scubapro B.C. #558	Accessory #562 \$36.00	None	None	25	19.5	4.5 x 9.75	—	3D	None	.918	25	27.25	Double 7x4 7x3	Black	\$90.00
Seaqwest Fenzy	Accessory \$26.99	Yes	None	23.5	18	7.5 Dia.	One .8125	3D	None	.875	17	None	None	Orange	\$215.00
Seaqwest M-90	Accessory \$26.99	None	Single 25 gm	21.5	15.25	5x8	Two .4375	3D	Yes	.75	15	27.25	None	Yellow	\$86.00
Seatec BC-V	Accessory PB-1 \$39.95	None	Double 16 gm	24.5	19	4x9	Four .4375	3D	Yes	.8125	14.375	39	Double 6.5 x 5	Yellow or Black	\$91.95
Seatec BB 301	Accessory SKY-73099 \$34.95	None	Optional	21	17	7.5 x 6.5	—	Flat	None	.8125	12.5	38.25	None	Orange, Yellow or Black	\$39.95
Sportsways Deluxe Waterlung Buoy. Control Vest #1860	Accessory #1851 \$55.00	None	Single 25 gm	25.5	18.5	4.25 x 9.5	Two .4375	3D	Yes	.75	16	36	Single 7.5 x 8	Orange	\$84.00
U.S. Divers B.C. II #7040-00	Std. Equip.	None	Single 38 gm	23.5	18.5	5x10	Four .4375	3D	Yes	.6875	11	33	Single 7x8	Yellow or Black	\$146.50
White Stag Buoyansator VII #53975	Accessory \$30.00	None	None	23	18	5.75 x 9	—	3D	None	.75	16	31	Single 5.75 x 6	Black or Orange	\$85.00

The Emperor

Regally Rests off Lake Superior's Isle Royale

By Robert Duchrow

It was late evening when the loading of iron ore was completed. Hatch covers were placed over her massive locks and secured. Leaving Port Arthur, she cut a slow, steady course out of Thunder Bay. Reaching a predetermined point, she turned toward a heading that would take her past Blake Point light on the northwest tip of Isle Royale. At a methodical ten knots per hour, she moved through an unseasonably cold June evening. She never saw morning. At 3:15 a.m. she ran hard onto the Canoe Rocks. Momentarily held by her rent hull, her crew desperately lowered lifeboats. Suddenly, sliding backwards, she sank among wreckage from her exploding boilers.

Thus died the steamer *Emperor* and 12 of her crew. Built in 1910 at the Collingwood Ontario shipyard, she sank June 4, 1947, near Isle Royale in Lake Superior.

Almost three decades later, she rests virtually intact where she sank. With a slight list to starboard, her 7031 tons have settled securely onto a gentle slope. Her stern is in 190 feet of water. 525 feet away, her bow points toward the shoal she collided with. Resting in 65 feet of water, the bow rises 30 feet off a hard rock bottom and can be seen from the surface on a calm, sunny day. Her starboard anchor hangs uselessly from its hawsepipe, while her port anchor is buried, holding against phantom wind and current. The pilot house is gone, destroyed by ice and winter storms, exposing the huge steam driven windlass. Anchor chain still secure, it seems as if it's waiting for a signal to raise the anchors.

Down from the windlass, past the first ore lock is the majority of the damage caused by striking the shoal, sinking, and over a quarter century of being pounded by surge and storm. The port side is torn from scupper to keel. As if a giant hand tried to twist and break the bow free from the rest of the ship, and almost succeeded. It lies at a different angle and direction. Twisted steel plates piled chaotically make the deeper intact ore locks a welcome change.

They are all open, huge chasms interconnected to form one gargantuan room. The covers are gone, blown free by escaping trapped air. The repetition of passing through the cav-

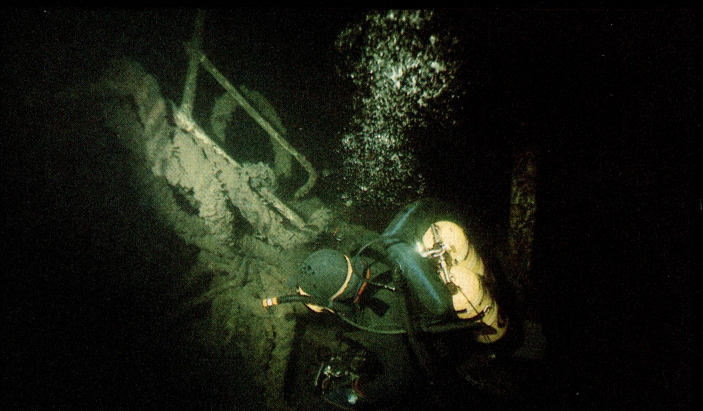
ernous holds is abruptly stopped upon reaching the stern.

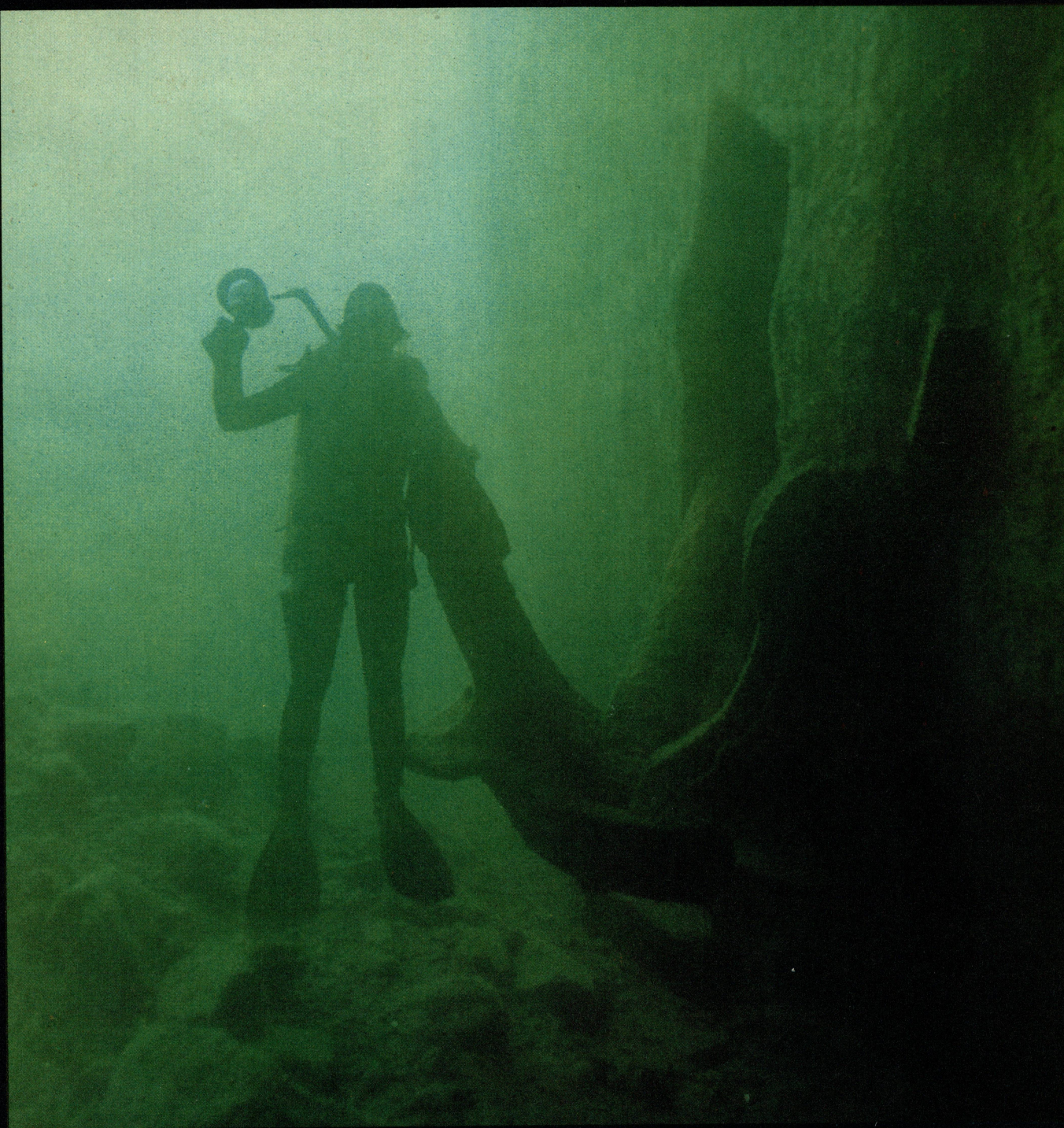
Here her name is displayed on a railing above the main deck just forward of the mast. As a headstone marks a grave, the sober black letters insure a marker for those who died here.

The mast, canted to port, is flanked by two huge ventilator ducts. The stack at first seems to be missing, destroyed when the boilers exploded. Almost unrecognizable, it hangs out over the port side, flattened and bent. Collapsed upon itself and torn free from the ship, it stubbornly remains. A foghorn is bolted to a small platform near the top of the stack. From here, suspended alongside the port cabins, the mast rises toward the surface 120 feet above. While in contrast, the side of the steamer plunges to the rock strewn bottom 40 feet below. The davits and blocks are empty, leaving no clue as to whether the lifeboats were launched or washed free as she sank.

Below the davits, the crew's quarters, storage rooms, and ship's galley lead to the stern at 150 feet. Huge, eight foot long spare propeller flukes are bolted to the deck near the stern rail, awaiting a repair that will never be needed. The fantail has collapsed, partially covering the deck. Forward of the fantail, above the starboard and port cabins, and just sternward of the stack is a large rectangular opening exposing the top of her 1500 horsepower steam engine.

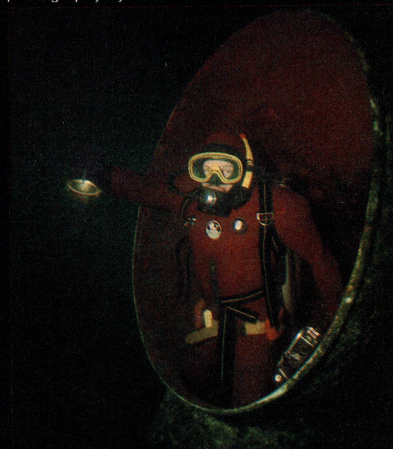
Moving down past the engine, evidence from the exploding boilers can be seen. Twisted and broken staircases, uprooted pipes and cable, and distorted steel plate lead to lower levels that are intact. Switch boxes with manufacturers' names still legible, undamaged gauges, light bulbs screwed in their sockets, valves that turn and whole working panels reveal something unusual in wreck diving. A phenomenon of a huge ship, in 60 to 100 foot visibility, that hasn't been stripped. National Park Service jurisdiction, mandatory diver registration and heavy penalties for removing anything off the *Emperor* and other Isle Royale shipwrecks have greatly helped. But maybe it is also a willingness to preserve an object of personal excitement for others to experience. That excitement is felt by everyone who visits the *Emperor*.





photography by Author

In the far left photograph a diver is shown along a railing on the upper deck of the Emperor overlooking the ore locks, the ship's name displayed on the railing. The next photograph to the left shows a diver on the stern of the wreck examining a length of huge rope that is intertwined with a davit. The above shows a diver next to the starboard anchor as it hangs uselessly from its hawse pipe. The photograph on the right is of a diver inside one of the Emperor's ventilators. The Emperor ran hard into the Canoe Rocks in 190 feet of water in 1947 near Isle Royal, Lake Superior.



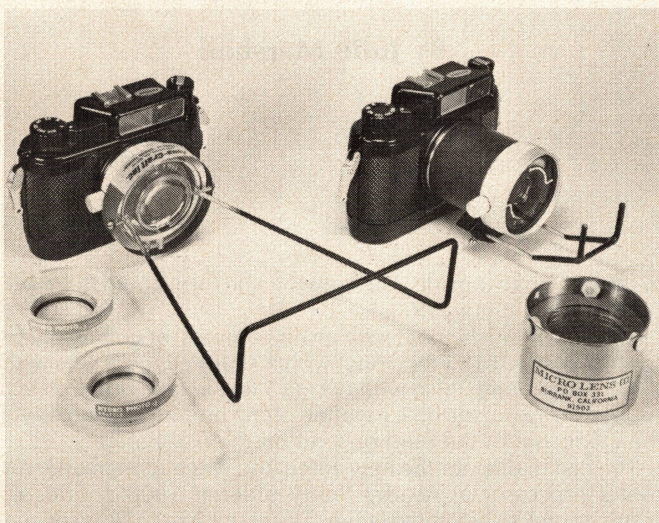
of underwater photography



By Jim and Cathy Church

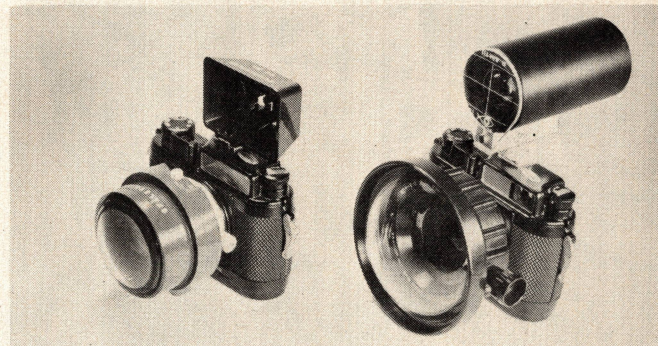
OTHER ACCESSORIES

Close-up Equipment. Close-up lenses can be placed in front of the standard Nikonos 35mm lens (and sometimes the 28mm lens) to reduce the focused distance to a couple feet or less. For even closer work, an extension tube can be placed between the camera body and lens to reduce the focused distance to a few inches. Because the camera viewfinder doesn't work well at these close distances, a variety of probes, wands and focal frames are available for estimating distance and sometimes the picture area. Our illustration shows a "Green Things" close-up lens on one Nikonos (left) and a Subsea extension tube on the other. Also shown are a set of Hydro-Photo close-up lenses and a Micro Lens III.



Wide-angle Lenses. Wide-angle lenses allow you to photograph large subjects, such as a diver or groups of divers, at minimum camera-to-subject distances. The two wide-angle lenses shown are the "Green Things" Opal-Eye and the Seacor's Sea-eye 21mm lens. The Opal-eye fits in front of the standard Nikonos 35mm lens with a press fit. It is an optical widener which widens the picture angle of the 35mm lens to

approximate the angle of a 21mm lens. The Sea-eye 21mm lens attaches to the Nikonos body in the same manner as any of the Nikon lenses.



Electronic Flash Units. Electronic flash units — usually called strobes — are popular accessories for Nikonos photography. Some companies manufacture submersible strobes which (like the Nikonos camera) are O-ring sealed. Other companies manufacture housings for conventional strobes. In our illustration, a Nikonos camera is attached to a bracket which also holds a Sekonic Marine Meter in a plastic mount. The Subsea Mark 25 submersible strobe can be attached to the post at the left end of the bracket.



photography by Authors

PHOTO QUIZ

1. Will lenses which fit the Nikonos III also fit the older models of the Nikonos camera body?
2. Will flash connectors which fit the Nikonos III also fit the flash sockets of older models?
3. Which of the Nikon U/W lenses are designed for U/W use only?

NOTE: Neither Jim and Cathy or SDM can critique your work.
Answers to the above: (1) yes, (2) no, (3) 28mm and 15mm.

ASSIGNMENT

Think about the subjects in the area where you usually dive. Ask yourself these questions:

1. What would you photograph with a wide-angle lens?
2. What would you photograph with a regular lens?
3. What would you photograph with a close-up lens or extension tube?
4. Which subjects would you think require flashbulb or strobe lighting?



Last Flight of the Wingless Duck

By Julie Marshall

Down in the lower Puget Sound area of the Pacific Northwest two young men are bringing ducks up from the floor of the bay. These aren't birds they have shot down on a hunting trip, but instead are giant clams, native to the Pacific Coast from Mexico to southern Alaska, and most plentiful in the Puget Sound area. These large clams are named geoduck but pronounced "goeey duck," a word of Chinook origin. These are the largest burrowing clams in the world, weighing up to five pounds each. Geoducks are distinguished from the horse clam by the two clean siphons. The horse clam has a hairy like growth on the tip of its siphons and is often covered with barnacles or seaweed.

Dennis Hoff and Hugh Buchholz, a tall, well built blond man, have incorporated the clam diving business under the name of Northwest King Clam and Diving Service.

Buchholz and Hoff, a big friendly man with an Ernie Borgnine smile, harvest on the average of 500 pounds of king clams a day from their 38 acres of underwater property leased from Washington through the Department of Natural Resources.

Four years ago Hoff and Buchholz were ironworkers when they decided to split and go into business for themselves.

The men had never dived commercially before this enterprise but had enjoyed it as a sport. They knew how good the geoduck is, with its sweet, tender, mild flavored meat, but they also knew how hard it is to dig with a shovel and that it can be dug only at extremely low tides. As there are only about 20 of these tides a year, it made the geoduck nearly unavailable. With underwater diving, the big clams would be available every day of the year. Because of this they felt that there would be a future in commercially dug geoducks.

The two men then bought an old 36 foot surplus navy landing craft on which they had to build a cabin. Instead of scuba gear they bought full face masks attached to a surface air supply and a communication system with the boat. This enabled the men in the water to talk directly into their face masks

to the crewman topside. The crewman, in turn, could talk back to the men underwater.

They outfitted the boat with an air compressor connected to two hoses, each 125 feet long, which supplied the divers with air. A water pump, also with two 125 feet hoses with nozzles, similar to the nozzle on a gasoline pump hose, was used to dig the clams out of the mud or sand on the bay bottom.

The first market for the new enterprise was a foreign one. An oyster processor at nearby Purdy ordered 5000 pounds of clams a week to be sent to Japan. The clams had to be taken out of the shells, skinned, frozen and shipped by boat to Japan. The market later dwindled but the men feel there is no a large potential market in Japan as the waters there are becoming polluted and the people there are becoming more affluent.

On working days, Hoff and Buchholz spend from two to four hours underwater, depending upon the depth. Usually, they dive at depths from 20 to 50 feet. Geoducks live at depths up to 180 feet but, at present, it is impractical to harvest that deep.

Before the diving business was started, the State of Washington had made a survey of the area and it was charted. Then a bid for leasing the area was made to the State. There were several bidders, but Hoff and Buchholz obtained the bid, which gave them a lease of 38 acres of marine bottom for five years. This particular lease is located in Pitt Passage, west of Wyckoff Shoal. The 38 acres does not infringe on any private property since the lease states that no dive may be made less than one quarter mile from the beach at the low tide mark. Thus there is ample area for propagation. With only one other company, located in Paulsbo, north of Tacoma, harvesting geoducks in the Puget Sound area and with the abundance of the clams underwater, it is extremely unlikely that this supply will be exhausted, Buchholz said.

A typical day for Hoff and Buchholz begins at Longbranch, where they keep their boat. From there it is only a short distance to the diving site. When they reach the geoduck beds,

they suit up, take a wire basket about the size of a garbage can and their air hoses and jump into the water. Having calculated their diving area for the day with sextant, chart and three fingered protractor, they go to the bottom, find the clams and dig them out of the mud or clay bottom with the hoses. The clam is then placed into the wire basket which each has taken to the bottom with him. Once the clam is dug, the area is murky from sediment stirred up by the terrific jets of water. This requires the divers to work against the current to see where they are digging.

Fifty geoducks fill a basket. When this is accomplished Hugh or Denny call to the crewman topside, who then lowers a rope with a hook on the end of it. The wire basket is attached to this hook and raised to the deck of the boat by a hand operated winch. The crewman then unloads the underwater basket and packs the clams into long narrow wire baskets about 15 per basket, and the collecting basket is again lowered to the diver. As the clams are to be delivered the same day, there is no special preserving or freezing process necessary. These huge clams are hardy and can live several days out of the water.

At a depth of 20 feet a diver can stay down indefinitely but usually comes up within a couple of hours because of being tired and cold. Their maximum stay underwater in a single day is four hours, divided into two hour stints.

Once the daily quota has been reached, their work day is still not over. They must then take the boat back to her moorage, clean and stow their gear, dress, pack their truck with the clams and make their deliveries, for which they have had prior orders. Most of these orders are delivered to taverns from Tacoma south through Centralia, Chehalis, Hoquiam, Aberdeen, Castle Rock, Longview and Kelso. Local orders are also filled at that time.

These out of town orders are placed with the taverns by private individuals although a few taverns do use geoducks for their clam strips. The men think that when the tavern patrons realize how much better the geoduck clam strips are than those from regular clams, more taverns will be using them.

At one time, the men made a dish called Clam Royale. The clam was removed from the shell, the edible parts ground and mixed with Hugh's own secret ingredients and seasonings and returned to its cleaned clam shell, covered with grated cheese, frozen and sold to taverns. These, again, were bought by tavern patrons for use as a party snack or as an entree around which to build a meal. All one had to do was pop it into the oven for 20 minutes and heat it thoroughly and melt the cheese, and out came a seafood delicacy.

The men are sometimes asked if there are any inherent dangers in this kind of work.

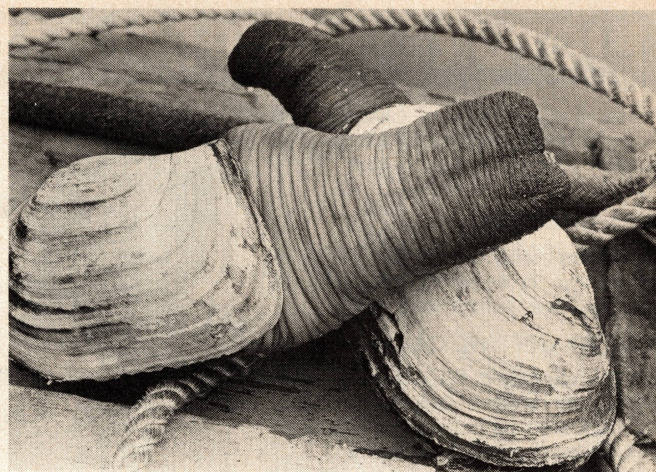
Buchholz said, "If a person follows the rules there is no reason for diving to be anymore dangerous than driving the freeway, and it's probably a helluva lot less so. But one time we did break the rules and went down with no one on deck to keep an eye on things. Our air compressor ran out of gas and we started to breath hard. We both shot to the surface and broke water at the same time."

Hoff recalls the time he was confronted by about eight gray sharks, which are a little longer than a man. He said, "I know these sharks aren't supposed to be dangerous, but do they know it? I didn't waste time finding out."

The men believe there is a great future market, not only for geoducks, but for sea urchins, sea cucumbers and other forms of marine life not yet accepted by the majority of Americans. They hope to open other markets outside the United States — Japan, for instance, where sea urchins are a delicacy.

Hugh Buchholz and Dennis Hoff agree that our future food supply will come from the sea, therefore it is inevitable that the diving business will grow and that they will be in on the ground floor.

They feel that the geoduck will at last fly on the wings of cargo planes to all parts of the world. »



Photography by Robert Rudsit

Geoducks are the largest burrowing clams in the world, weighing up to five pounds each. These giant clams are native to the Pacific Coast from Mexico to southern Alaska, and most plentiful in the Puget Sound, Washington, area. Because of the divers on these two pages, the geoduck's sweet, tender, mild flavored meat is now available every day of the year.



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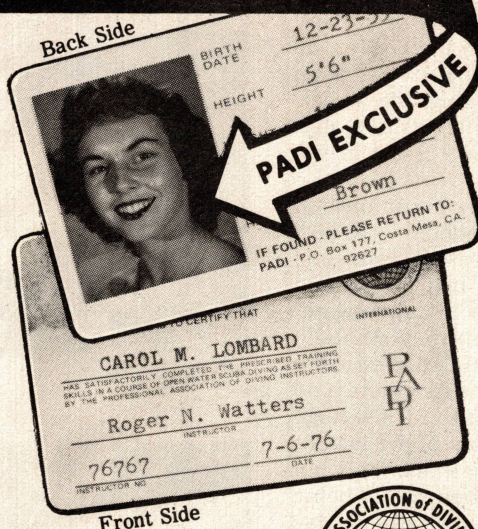
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P·A·D·I



Post Med Trip To Anthony's Key

Lee and Helen Turcotte of Atlantis Safaris will be escorting a group to Anthony's Key Resort on a post Undersea Medical Society dive trip. The Undersea Medical Society Scientific Meeting will be held in Miami Beach on May 12 and 13 at the Carillon Hotel. Jefferson C. Davis, M.D., Vice President of the Un-



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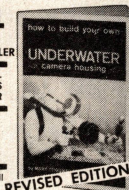
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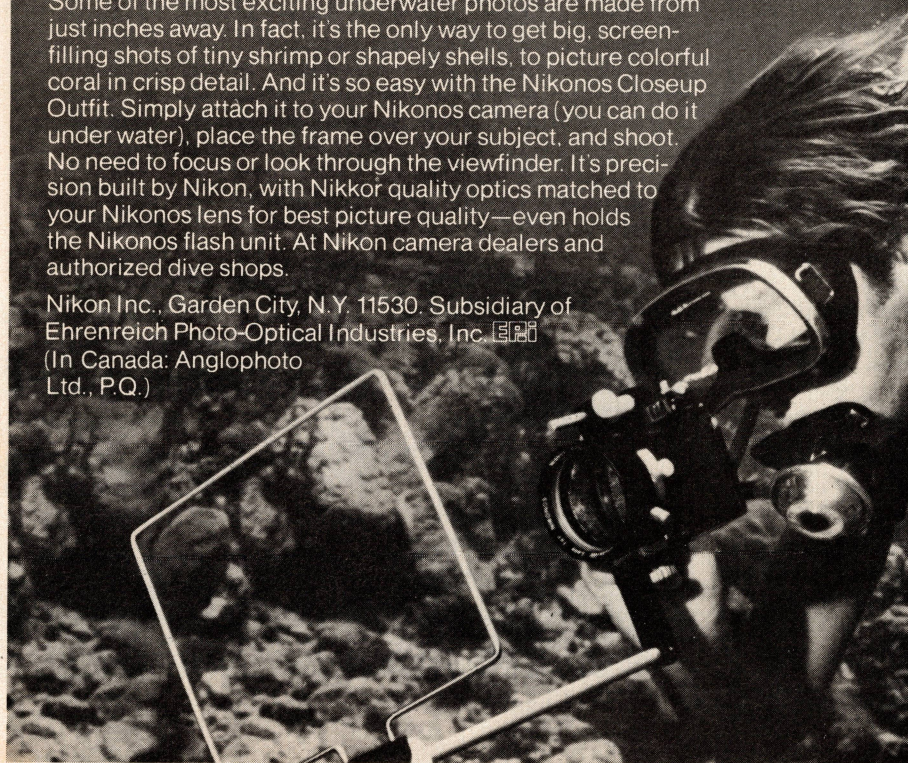
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dersea Medical Society, is program chairman of the Miami Beach meeting.

On Friday morning, May 14, the Atlantis Safaris group will depart Miami International Airport on Tan Airlines for Anthony's Key, a diving resort on Roatan Island in the western Caribbean. The trip is May 14 - 18 and will feature three and a half days of diving plus a night dive. Arrangements can be made for those who wish to remain at the resort for a longer period of time. The dive boat is spacious and fully equipped. Diving will include the famed Hole in the Wall plus a full day of diving at West End Point where the drop-off and reefs offer superb diving and spectacular subject matter for the underwater photographer. Horseback riding, sailing and fishing and other activities are also available.

For a brochure, more information and to book the trip, please contact Atlantis Safaris, P.O. Box 530303, Miami Shores, Florida 33153.

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For more information about diving in the Dominican Republic write to the Punta Cana Club c/o Wolfe International, 500 Fifth Ave., N.Y., N.Y. 10036 or call us toll free (800-223-5695); from Canada (416-364-1101); and local (212-730-8100), or call your travel agent.

Please send me more information about the Punta Cana Club and diving in the Dominican Republic.

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**DOMINICANA
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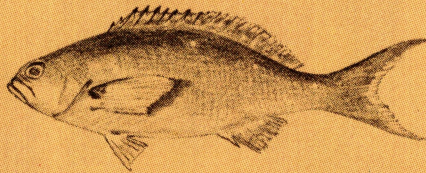
aquaventures

The Creole Fish

(*Paranthias furcifer*)

The deeply forked tail may be the first thing that the diver may notice about the creole fish. It was certainly observed by the ichthyologists who gave the fish its generic name, since *furcifer* comes from the Latin words for "fork" and "I bear," meaning, "I bear a forked tail." This information comes from ichthyologist Warren Zeiller, who also tells us that *paranthias* is composed from the Greek word for "near" and the ancient Latin name for a fish, *anthias*. The creole fish was thought to be similar or related to the ancient *Anthias*.

□ In addition to the concave tail, there are other distinguishing characteristics of the creole fish, a member of the serranidae family of sea basses and groupers. Overall, the fish is reddish brown or a dark grey, shading to a pale salmon in the region of the belly. There is a bright red-orange spot at the upper base of the pectoral fin. Although it is not obvious on our pictured specimen, there are usually three small white spots along the back, above the lateral line. □ Ichthyologist John Randall found that the creole fish occurs primarily in littoral, inshore areas in the tropical Atlantic (Caribbean) and eastern Pacific. Carleton Ray and Elgin Ciampi describe it from Cape San Lucas to the Gala-



adult specimen

pagos Islands, Cuba to Brazil. It is a small fish and reaches only 10 to 12 inches in length. It is relatively common where found, in depths ranging between 30 to 200 feet, always near reefs. Randall found that the creole fish schools in small groups, drifting several feet above reefs on individual planktonic animals, which it picks out one by one from the passing water mass. At any sign of danger the creole fish will dart for shelter in the typical style of the smaller serranids. However, in studying their feeding habits, Randall noted

the small mouth, small teeth, numerous gill rakers, fusiform body and the deeply forked caudal fin of the creole fish were departures from the typical bass or grouper morphology, and that they were all specializations for midwater feeding on zooplankton. Specifically, the creole fish eats

copepods (the largest part of its diet), tunicates, shrimps and shrimp larvae, amphipods, and fish larvae. This diet is an additional departure from another serranid trait. Usually the sea basses are carnivorous and feed mostly on fishes and crustaceans. Perhaps these differences are reasons why the student of ichthyology will generally find the creole fish grouped in a class by itself. >

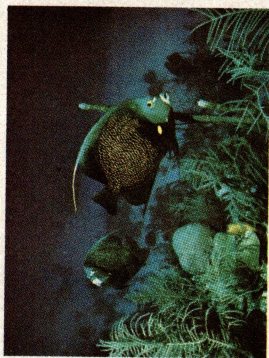
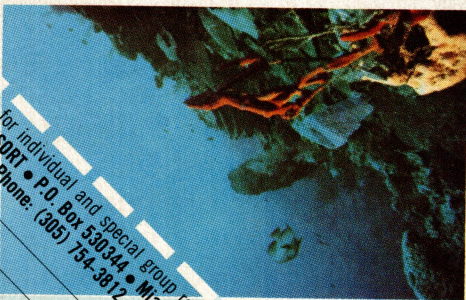
Photo By Carl Roessler—Text By Hillary Hauser

The photo was taken in 40 feet of water off Bonaire. Photographer Roessler used a Nikon F camera with a 55mm lens and a Bauer strobe, Kodachrome 25, 1/60 sec. at f11, 15 inches from subject.



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Underwater Adventures

Sam Davidson, President of Dacor Corporation, announced a new operator membership classification of the Underwater Adventurers Association of Dacor. The memberships now available are: individual membership for USA members at \$3; individual memberships for non-USA members at \$5; dealer memberships at \$25, and the new diving operator memberships at \$750 annually. Davidson said the new operator membership includes a \$2,000,000 group insurance policy set up to cover the public liability of the offshore, outside the United States, diving operators, diving retailers, hotels servicing traveling divers and diving resorts.

The insurance was obtained by Scuba Consultants, Ltd. for the Associations' operator members due to the requests by hotels, resorts and cruise ships to protect their investments from the growing claims due to the recent diving legislation controversy. As the popularity of diving travel increases, so does the need for insurance coverage.

The travel programs of the Association are promoted through the 1000 Dacor dealers who handle the memberships in the Underwater Adventurers Association. The travel programs offer the lowest cost diving travel, group travel rates for only two divers traveling together. Each program includes accommodations (double occupancy), minimum of two meals per day, diving, tanks, air, belt weights, guides and boat, transfers and taxes.

The new operator membership public liability with \$2,000,000 is a first in the diving field and allows for the defense of all claims in the country of origin and in the United States. The Underwater Adventurers Association invites all inquiries in regards to any memberships and the new group insurance benefits of the operator membership sent to UAA-SC LTD., 238 Sunset, Gen Ellyn, IL 60137, USA.

Western Airlines Baggage Rates

Rates have been revised by Western Airlines to simplify excess baggage charges. Passengers will be charged \$5 for each bag over the standard two pieces of checked baggage for domestic travel in the U.S. and Canada.

Bicycles and surfboards are \$10 each; scuba equipment, \$5, and one or more live animals carried, \$15 per container.

Also, passengers checking excess baggage with a connection with another participating airline will pay the flat \$5 per piece rule to cover the entire trip.

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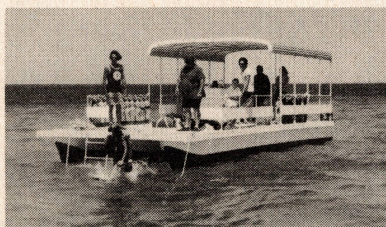
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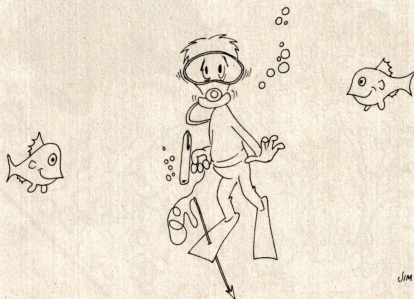
Successful candidates will be awarded open water instructor certification. Certification is not guaranteed by attendance of the course, but is determined by a satisfactory completion of the requirements for instructor set forth by PADI.

To qualify, candidates must be certified scuba divers, over 18 years of age, who have at least 30 hours of open water diving experience in the past two years. They must submit a current satisfactory medical report and possess the American Red Cross lifesaving certificate, or its equivalent.

The course will deal mainly with teaching the instructors to teach. Candidates are expected to be fully up-to-date on all diving related subjects at the start of the course. The course is concerned mainly with methodology of diving instruction.

Cost of the course is \$250 per person, double occupancy. The cost includes accommodation at the Pilot House and gratuities, hotel tax, use of tanks and weight belts, air, lectures, all water sessions and graduation party.

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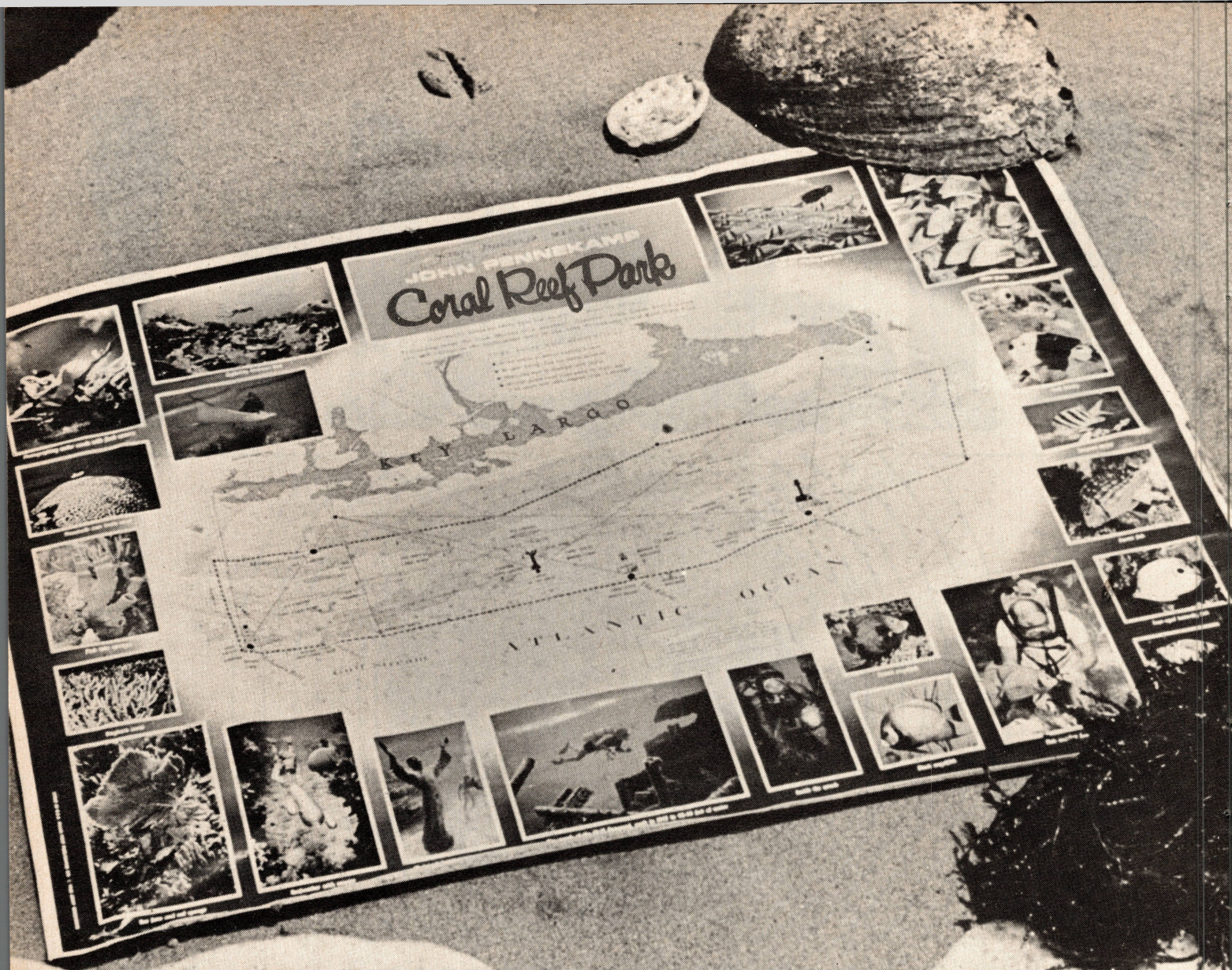
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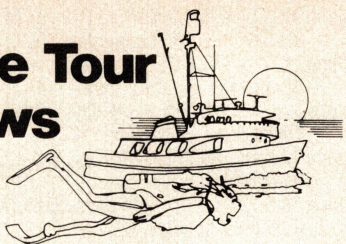
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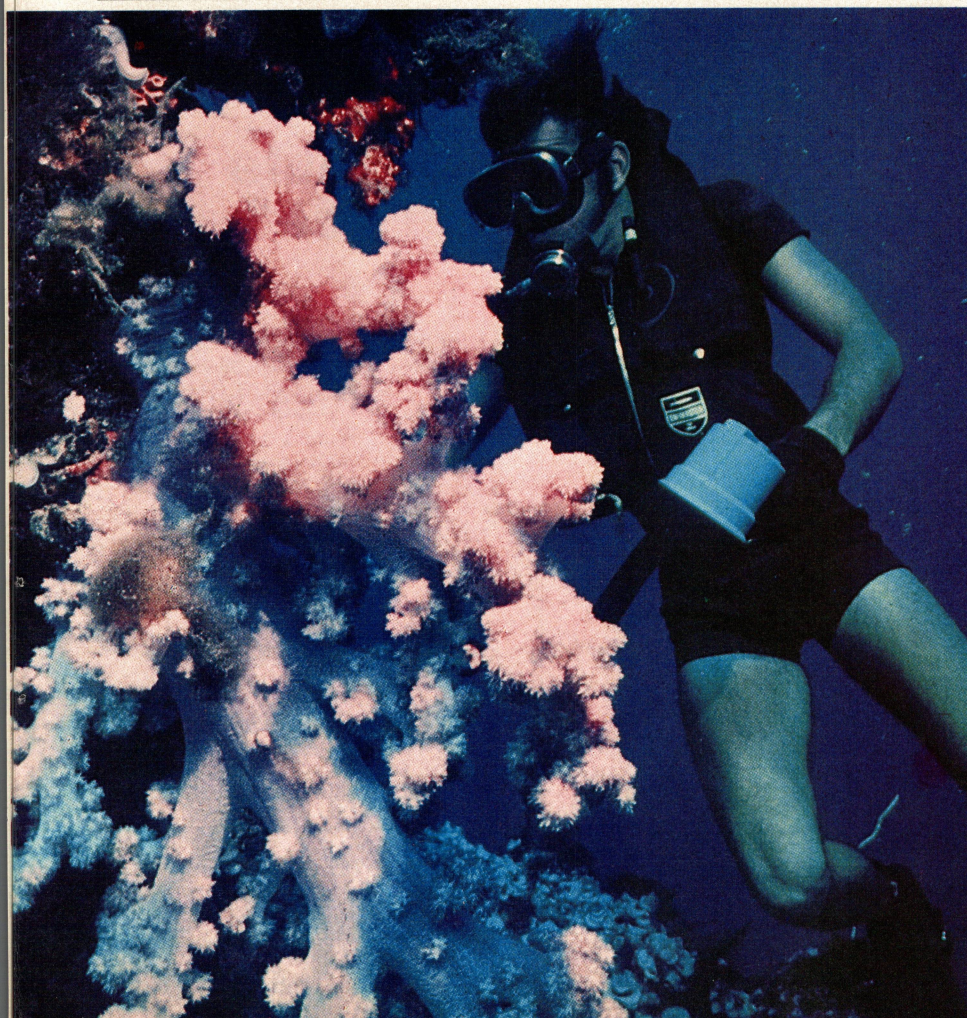
Dive Tour News



Apr. 1, 11, 21 — Bimini — 7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 Apr. 2, 17, 25 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, FL
 Apr. 2, 9, 16, 23, 30 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 Apr. 2, 9, 16, 23, 30 — HAITI — 5 or 8 days, Oceaneers Dive Tour Inc., Hollywood, FL
 Apr. 3 — FREEPORT — 8 days, Go Diving, Inc., Minneapolis, MN
 Apr. 3 — SAN SALVADOR — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 Apr. 4 — CARTAGENA, COLOMBIA — 8 days, Sunland Int'l Tours, Beverly Hills, CA
 Apr. 5 — RED SEA/SINAI — 10 days, International Divers Association, Chicago, IL
 Apr. 7 — FLORIDA CAVES — 5 days, Berry Distributors, Inc., Alsip, IL
 Apr. 7, 14, 20, 27 — Bimini — 5 days, Capt. Tom Guarino, Key Largo, FL
 Apr. 9 — BONAIRE — 7 days, Scuba Tours, Fairfax, VA
 Apr. 10 — GRAND CAYMAN — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL

Apr. 10 — CUNCUN — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 Apr. 10 — COZUMEL — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 Apr. 10 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, CA
 Apr. 10, 20 — Bimini — 7 days, Capt. LaChance, Adventure Cruises, Ft. Lauderdale, FL
 Apr. 11 — BELIZE — 7 days, Go Diving, Inc., Minneapolis, MN
 Apr. 14, 28 — MAJURO — 9 days, Micronesian Expeditions, Salt Lake City, UT
 Apr. 16 — JAMAICA — 7 days, Happy Wanderer, Bronxville, NY
 Apr. 16 — ROATAN — 8 days, Lisind Int'l, New York, NY
 Apr. 16 — ELEUTHERA, BAHAMAS — 8 days, Lisind Int'l, New York, NY
 Apr. 16 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, CA
 Apr. 17 — BAJA EXPEDITIONS — 8 days, Baja Expeditions, Inc., San Diego, CA
 Apr. 17 — PROVIDENCIALES (CAICOS) — 8 days, Turcotte, Atlantis Safaris, Miami Shores, FL
 Apr. 17 — ST. THOMAS, VI — 8 days, Happy Wanderer Travel, Bronxville, NY
 Apr. 17 — GRAND CAYMAN — 8 days, Happy Wanderer Travel, Bronxville, NY
 Apr. 17 — DOMINICAN REPUBLIC — 8 days, Lee Turcotte, Atlantis Safaris, Miami Shores, FL
 Apr. 17 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
 Apr. 18 — SAN ANDRES — 8 days, Go Diving, Inc., Minneapolis, MN
 Apr. 19 — KONA — 5 days, Horizons International, Seattle, WA
 Apr. 24 — ROATAN — 8 days, Go Diving, Inc., Minneapolis, MN
 Apr. 24 — BONAIRE/CURACAO — 9 days, See & Sea Travel, San Francisco, CA

Apr. 25 — SAN SALVADOR, BAHAMAS — 8 days, Lisind Int'l, New York, NY
 Apr. 27 — TAHITI/RANGIROA — 16 days, Dewey Bergman, See & Sea, San Francisco, CA
 May 1 — Bimini — 10 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 May 1 — COZUMEL — 8 days, Go Diving, Inc., Minneapolis, MN
 May 1 — SAN SALVADOR — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 May 1 — COZUMEL — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 May 1 — FLORIDA KEYS — 7 days, Berry Distributors, Inc., Alsip, IL
 May 3, 17, 29 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, FL
 May 4, 12, 19 — Bimini — 7 days, Capt. Tom Guarino, Key Largo, FL
 May 5 — GALAPAGOS — 15 days, Jack McKenney, See & Sea Travel, San Francisco, CA
 May 7, 14, 21, 28 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 May 7, 14, 21, 28 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL
 May 8 — FREEPORT — 8 days, Go Diving, Inc., Minneapolis, MN
 May 8 — SEA OF CORTEZ — 9 days, Sunland Int'l Tours, Beverly Hills, CA
 May 8 — Bimini — 10 days, Capt. Skeet LaChance, Adventure Cruises, Ft. Lauderdale, FL
 May 8 — AQABA, JORDAN — 15 days, See & Sea Travel, San Francisco, CA
 May 8 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, CA
 May 12, 22 — Bimini — 7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 May 12, 26 — MAJURO — 9 days, Micronesian Expeditions, Salt Lake City, UT
 May 14 — ANTHONY'S KEY RESORT, ROATAN — 4 days, Atlantis Safaris, Miami Shores, FL



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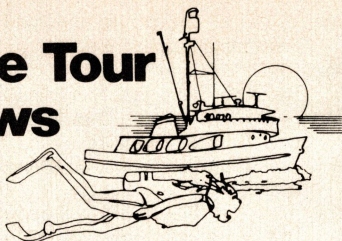
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Dive Tour News



May 14, 21 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 May 15 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
 May 16—BELIZE—7 days, Go Diving, Inc., Minneapolis, MN
 May 17 — RED SEA/SINAI — 10 days, International Divers Association, Chicago, IL
 May 17 — KONA — 5 days, Horizons International, Seattle, WA
 May 18—BIMINI—10 days, Capt. LaChance, Adventure Cruises, Ft. Lauderdale, FL
 May 22—SAN SALVADOR—8 days, Happy Wanderer, Bronxville, NY
 May 22 — SAN SALVADOR — 8 days, Happy Wanderer Travel, Bronxville, NY
 May 22 — ST. THOMAS, VI — 7 days, Happy Wanderer Travel, Bronxville, NY
 May 22 — VIRGIN GORDA/ST. MARTEEN — 12 days, Trimaran Misty Law, St. Thomas, VI
 May 22 — BONAIRE/CURACAO — 9 days, See & Sea Travel, San Francisco, CA
 May 23—SAN ANDRES—8 days, Go Diving, Inc., Minneapolis, MN
 May 28 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, CA

May 29—ROATAN—8 days, Go Diving, Inc., Minneapolis, MN
 May 29 — BRITISH HONDURAS — 7 days, Berry Distributors, Inc., Alsip, IL
 May 29 — CANCUN — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 May 29 — GRAND CAYMAN — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 June 1—BIMINI—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 June 1 — TAHITI/RANGIROA — 16 days, Carl Roessler, See & Sea, San Francisco, CA
 June 1 — CAY SAL 3 days, Capt. Tom Guarino, Key Largo, FL
 June 4, 11, 18, 25 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 June 4, 11, 18, 25 — HAITI — 5 or 8 days, Oceaneers Diver Tours Inc., Hollywood, FL
 June 4, 16 — GRAND CAYMAN — 12 days, Sierra Club, San Francisco, CA
 June 5—COZUMEL—8 days, Go Diving, Inc., Minneapolis, MN
 June 5 — ST. MARTEEN — 12 days, Trimaran Misty Law, St. Thomas, VI
 June 5 — SAN SALVADOR — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 June 5 — CAYMAN ISLANDS — 8 days, Rich Bergero, See & Sea, San Francisco, CA
 June 7 — CAY SAL — 4 days, Capt. Tom Guarino, Key Largo, FL
 June 7, 17, 27 — FREEPORT — 7 days, Capt. Skeet LaChance, Adv. Cruises, Ft. Lauderdale, FL
 June 9, 23 — MAJURO — 9 days, Micronesian Expeditions, Salt Lake City, UT
 June 9 — FLORIDA KEYS — 5 days, Berry Distributors, Inc., Alsip, IL
 June 10—FREEPORT—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 June 12—FREEPORT—8 days, Go Diving, Inc., Minneapolis, MN

June 12, 26 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, FL
 June 12 — ANDROS — 7 days, Fred Calhoun, Underwater Safaris, Boston, MA
 June 12 — CANCUN — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 June 12 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
 June 18 — ROATAN — 14 days, Explorer Division, BSA, Los Angeles, CA
 June 18 — CHINCHORRO REEF — 10 days, Sunland Int'l Tours, Beverly Hills, CA
 June 19—SAN SALVADOR, BAHAMAS—8 days, Turcotte, Atlantis Safaris, Miami Shores, FL
 June 19 — COZUMEL — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
 June 19 — ANTHONY'S KEY, ROATAN — 8 days, Atlantis Safaris, Miami Shores, FL
 June 19 — BELIZE BARRIER REEF — 14 days, Sierra Club, San Francisco, CA
 June 20—BELIZE—7 days, Go Diving, Inc., Minneapolis, MN
 June 20—FREEPORT—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 June 20—CAY SAL—5 days, Scuba Tours, Fairfax, VA
 June 26 — BR. VIRGIN ISLANDS — 12 days, Trimaran Misty Law, St. Thomas, VI
 June 27—SAN ANDRES—8 days, Go Diving, Inc., Minneapolis, MN
 June 30—FREEPORT—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 June 30 — GALAPAGOS — 15 days, See & Sea Travel, San Francisco, CA
 July 2 — ROATAN — 16 days, Trimaran Misty Law, St. Thomas, VI
 July 2, 9, 16, 23, 30 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 July 2, 9, 16, 23, 30 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL

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BVI U/W Photo Contest

For the second consecutive year, the British Virgin Islands Hotel and Tourist Association is sponsoring an underwater photography contest. All slides and prints submitted will be judged and exhibited during BVI Film Festival Week in Tortola (August 8-11). Paul Tzimoulis, publisher of SKIN DIVER, will be a special guest and contest judge at the Festival.

The waters of the British Virgin Islands (Tortola, Virgin Gorda, Peter, Jost Van Dyck, Anegada, Norman, Marina Cay, etc.) are world famous for the clarity of the water and the variety of colorful underwater marine life, as well as for many sunken wrecks dating back to Spanish galleons.

Prints and slides will be judged in six different categories, with first and second prizes to be awarded in each category. In addition, there will be two grand prizes awarded to top winners. The first prize will be: Two weeks of diving — one week at Little Dix Bay Hotel and one week at Peter Island Yacht Club; diving with Aquatic Center and the Kilbrides. The second prize will be: One week of diving — three days at Fort Burt Hotel and three days at Marina Cay; diving with Aquatic Center and Dive BVI.

Entries may be submitted any time prior to the closing date, July 31, 1976. For official entry form, which must accompany each entry, write to: Luana Marler, P.O. Box 108, Road Town, Tortola, British Virgin Islands; or to: BVI Tourist Board, 515 Madison Ave., New York, N.Y. 10022.

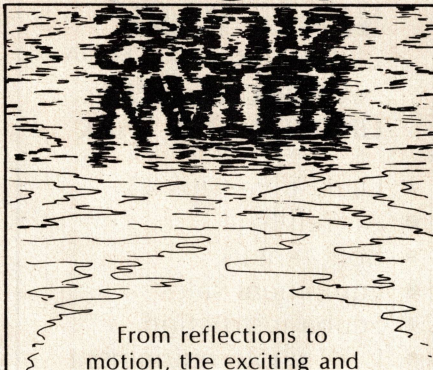
New Dive Market

The Happy Wanderer proudly announces the opening of a unique port-hole to an exciting lifetime adventure — The Happy Wanderer Travel and Recreation Market. This product of the combination of the spirit and the practice of coordinated recreational activity is located in the Scarsdale Minimax, 590 Central Park Avenue.

Happy Wanderer can now involve you more than ever before in recreational diving, here at our new market. Conveniently gathered under one roof are: The Happy Wanderer travel agents, who can secure your passage to any part of the world; the Westchester registrar of the Skin Diving School of New York, who can enroll you in your basic or advanced diving course, or in your underwater photography adventure; and a complete recreational diving equipment section selected by the staff of Cougar Sports to assist the travelling or student diver.

A unique marketplace indeed, designed for your recreational shopping needs and convenience, awaiting you in Scarsdale today. Their new address and phone numbers are: 590 Central Park Avenue, Scarsdale, NY 10583; (914) 472-9494, or (212) 882-0070.

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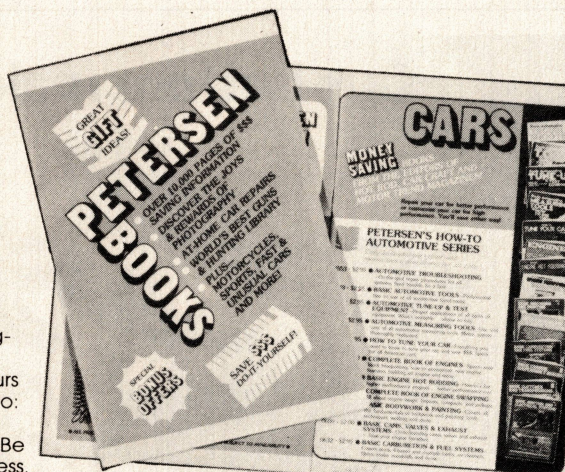
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Tortuga Club

Tortuga Club offers some of the best diving on Grand Cayman. It is on the east coast, surrounded by a barrier reef, located on miles of private sand beach. There are 14 spacious air conditioned rooms, each with a private patio. Dress is casual and informality is the feeling with all the creature comforts.

All diving areas are within 5 to 15 minutes boat ride with depths of your choice. Excellent snorkeling areas are right off the beach. Some of the favorite dive spots is the Tortuga Club Underwater Castle, The Wreck of the Ten Sails, The Garden of Eden, The Drop Off, etc. In just one day you may find yourself exploring an old coral encrusted wreck, gliding through an endless maze of tunnels homeycombing the reef, feeding beautiful French angel fish, and meeting up with a giant grouper.

Once you have finished your dive underwater, step into the dining room and "dive" into the homemade foods the club is famous for, such as: turtle steak, conch and welk pie, fresh baked breads, desserts, meat dishes and even beer pancakes.



The club also provides complimentary round trip transfers from the airport to hotel, welcome drinks, sunfish sailboats, bicycles, shuffleboard, table tennis, bumper pool, all free room service, and no out of pocket tipping.

All of this is plenty, but the big news for divers is that one dive boat trip per day is complimentary! You will enjoy diving with Wayne Brown, a PADI instructor from California and also an underwater photography instructor, and Darby Bodden, a local Caymanian who is a NAUI instructor and knows the sea better than the fish. Wayne will show some of his excellent slides to you in the evenings.

Winter rates are \$50 per person double occupancy and this includes all three meals per day. It is a memorable experience both above and below the water. For further information write: Tortuga Club, Box 496, Grand Cayman Island, BWI.

Teach/Tour Opens In Bonaire

Ray Morrow, President of Teach/Tour Diving Company, recently announced the opening of Teach/Tour's fourth diving resort facility on the Dutch Caribbean island of Bonaire. The new scuba operation is located on the grounds of the Flamingo Beach Hotel, a cozy 30-room beach resort just north of the island's airport. A completely new building has been erected adjacent to the beach front and has been completely stocked with a complete selection of U.S. Divers Co. equipment. The inventory includes 40 rental aluminum tanks with packs, 30 rental regulators with submersible pressure gauges, 20 safety vests and 60 sets of snorkeling equipment.

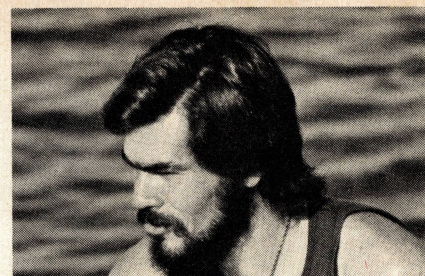
A 15.5 cfm Mako air compressor has been installed at the hotel dive shop and will pump pressures up to 3400 psi. A second 7 cfm Mako compressor has also been set up in reserve in case of repair or maintenance shut down. Supplementing the compressors is a cascade air storage abank consisting of a dozen 350 cubic ft. cylinders which can store air at pressures up to 3500 psi.

Teach/Tour has also installed a new 26 ft., triple pontoon Flattop dive boat capable of carrying up to 18 divers. The new craft is powered by twin 35 hp Johnson outboard engines. The dive boat will be

used for travel to nearby coral reefs which are located only five to ten minutes away from the dive shop. In addition to the large dive boat, the Flamingo Beach Hotel also has a 17 ft. Boston Whaler for smaller groups and special charters.

Ray Morrow has appointed Peter Hughes as the new resident Diving Director for Teach/Tour's facility on Bonaire. Hughes is originally from Trinidad and Tobago and has spent four years working as Dive Master at Anthony's Key Resort on the Island of Roatan, Honduras. He has spent almost 20 years of his life as a professional diver and underwater guide. Hughes is certified both as a PADI and YMCA scuba instructor.

Opening in March of this year, the new Teach/Tour dive facility represents a major expansion in Bonaire's growth and development for scuba diving tourism. The island is surrounded by close to 50 miles of excellent coral reef, offering some of the finest recreational diving opportunities in the southern Caribbean. Bonaire is one of the three major islands of the Netherland Antilles and is located approximately 50 miles north of the Venezuela coastline. It can be reached by daily jet flights from New York by either American Airlines or KLM Royal Dutch Airlines, with a brief stop-over in either Curacao or Aruba. Daily flights are also available from Miami aboard ALM Dutch Antillean Airlines.



Peter Hughes, Diving Director

Teach/Tour is offering a special one-week (eight days - seven nights) scuba diving vacation package for \$314. The package price includes: hotel room (double occupancy), breakfast and dinner, transportation to and from the airport, 12 scuba dives, tank, weight belt, air fill and dive guide. A lower priced six-dive economy package is also available for \$254.

Teach/Tour is a Pennsylvania based corporation with a complete dive resort facility on the island of Tobago and two more dive resort facilities in the Montego Bay area of Jamaica.

For more information and reservations, write directly to: Ray Morrow, Teach/Tour Diving Company, P.O. Box 390, 138-C Beil Avenue, Nazareth, Pennsylvania 18064. If you are in a hurry for the information, you can call direct on Teach/Tour's new toll-free interstate telephone number (800) 523-9361. Pennsylvania residents may call collect (215) 759-6882. ✉



This photograph was taken exactly 26 yards off the beach at Grand Cayman.

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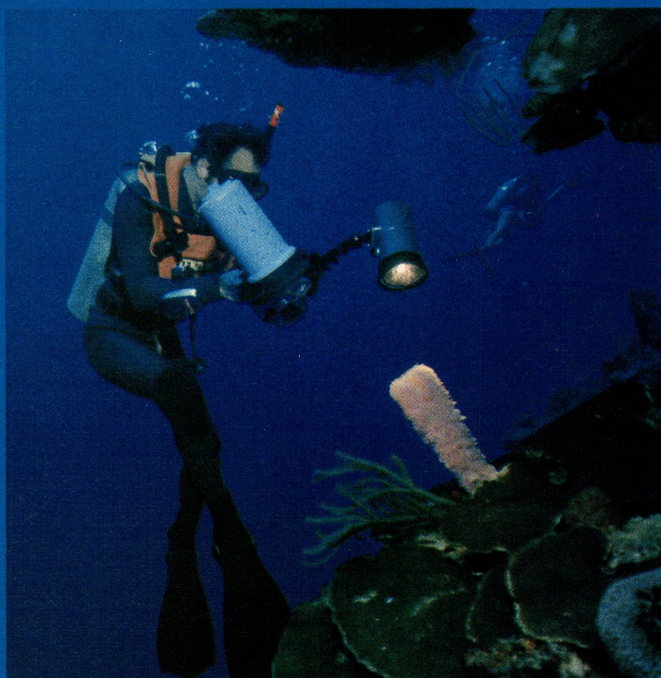
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Few vertical wall dives can match the thrill and fascination of Roatan's magnificent Hole-in-the-Wall. More than just another drop-off, this awesome coral formation provides an almost ethereal experience for the visiting diver.

The top of the drop-off averages 55 to 65 feet in depth. From the surface it looks as though two separate coral canyons have joined together in a "V" formation before going over the edge of the reef. Closer inspection reveals the sandy floor of these narrow ravines are sloping steeply downward, plunging

by Paul J. Tzimoulis

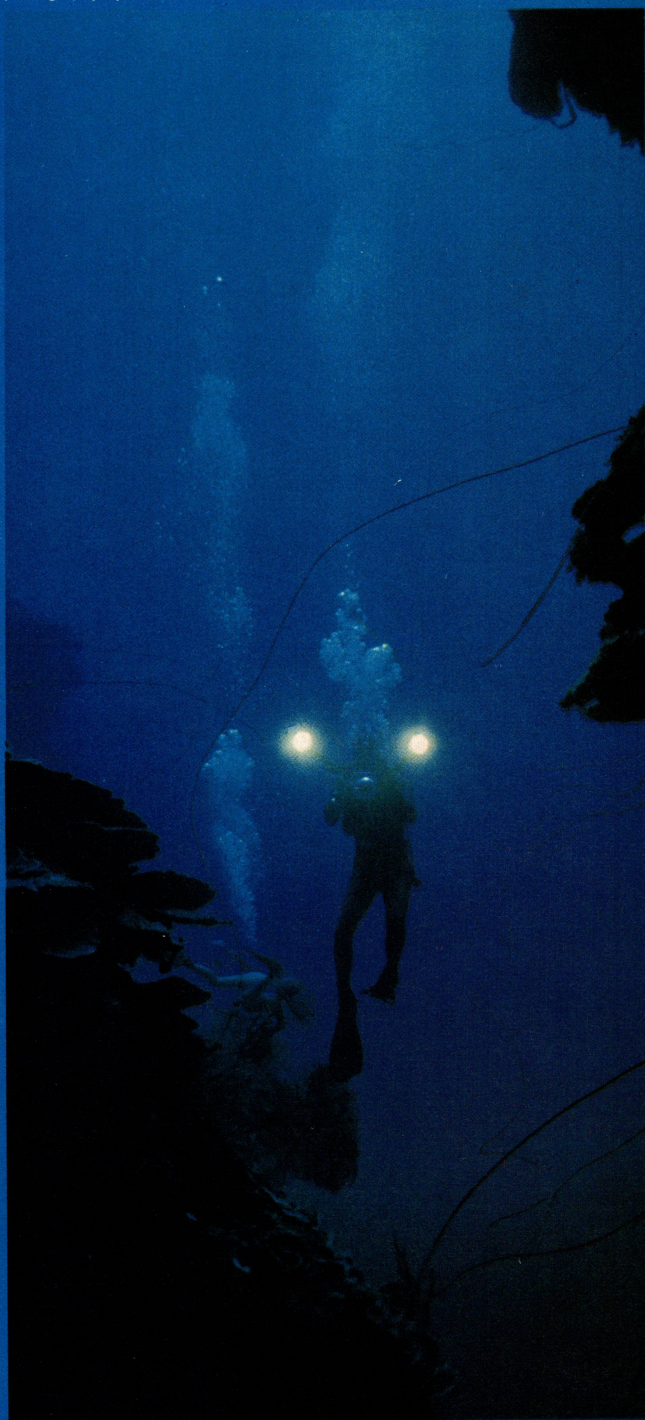


photography by Author

deeply into the massive bulwark of the coral reef. Once joined together, the ever narrowing crevasse becomes a vertical tunnel through the reef. The walls of the passage are adorned with slender tube sponges, sinewy wire corals, and small trees of black coral.

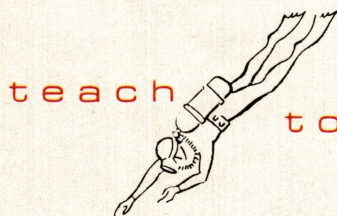
At one point, the steep tunnel is squeezed into a keyhole configuration, just large enough for divers to pass through one at a time. And shortly beyond that point the tunnel exits out onto the vertical wall of the drop-off at a depth of 130 feet. The scene confronting the diver is one of serene beauty. Visibility is usually 200 feet or better, thus providing a panoramic view of the entire cliff. Below the tunnel exit, one can see the coral slope slanting over deepward to the brink of a precipice at 180 feet. Both to the right and left stand towering cliffs of shelving coral — one of nature's most intricate sculptures. The face of these million year old facades are deeply etched with a wondrous variety of crevices, ledges, caves, and outcroppings. A diver could explore this undersea mountain for more than a month and never tire of it. A myriad of colorful sponges and graceful gorgonians seem to fill every crack and cranny, like wild mountain flowers in the late spring. And when one glances upward to view the sunlight sparkling through the keyhole, the sheer beauty of this spectacular reef is almost overwhelming.

Hole-in-the-Wall is located near the western end of Roatan Island, just two miles west of Anthony's Key Resort. Running time by boat from Anthony's Key or nearby hotels is approximately 15 to 20 minutes. Because of the depth involved, this spot is restricted to certified divers with experience and expert skill. All dives are escorted by a certified scuba instructor/guide. According to the guides who work in Roatan, and divers who have vacationed there, Hole-in-the-Wall is one of the Western Caribbean's most exhilarating dives. 





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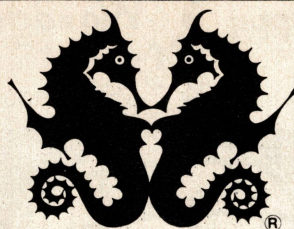
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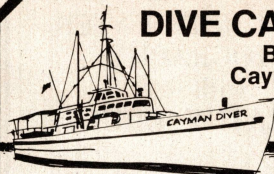
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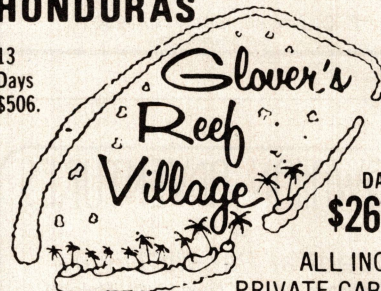
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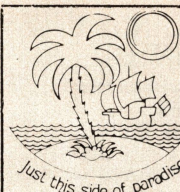
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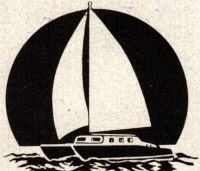
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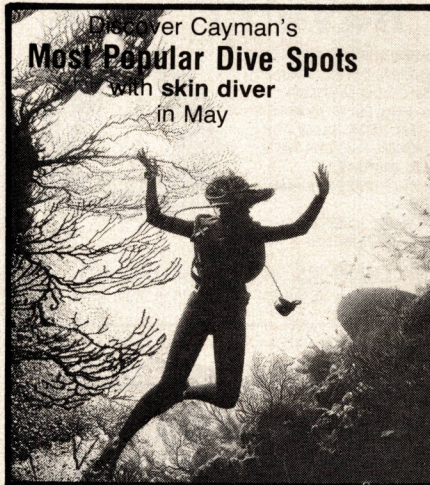
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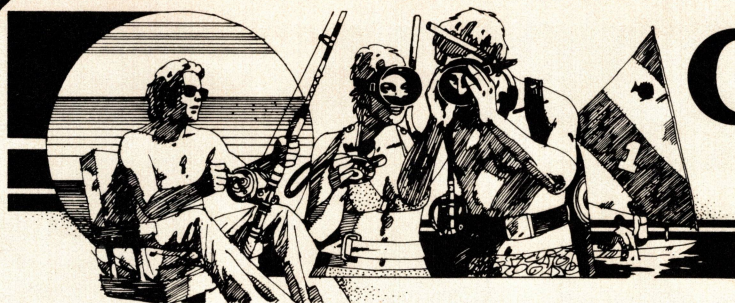
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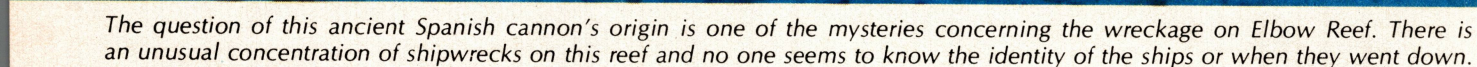
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The Elbow

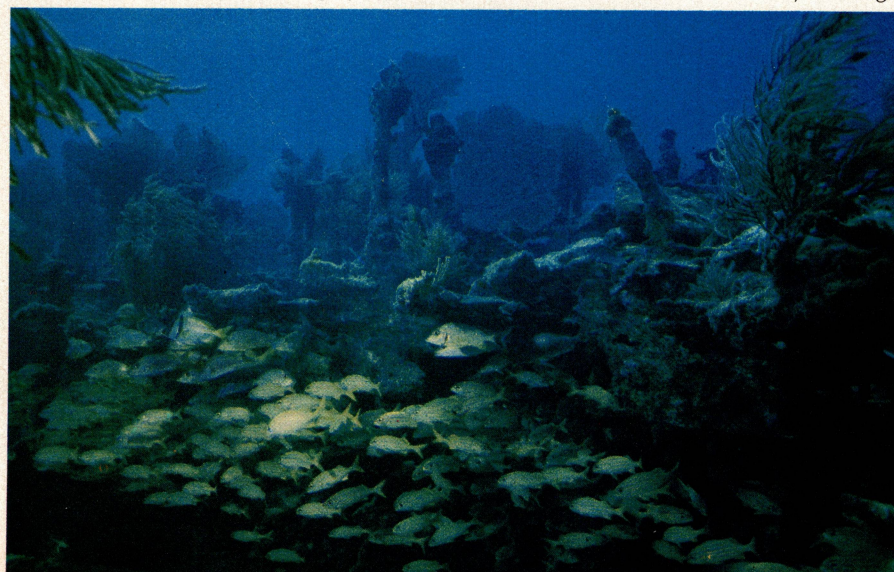
Pennekamp Park's most mysterious reef

by Paul J. Tzimoulis

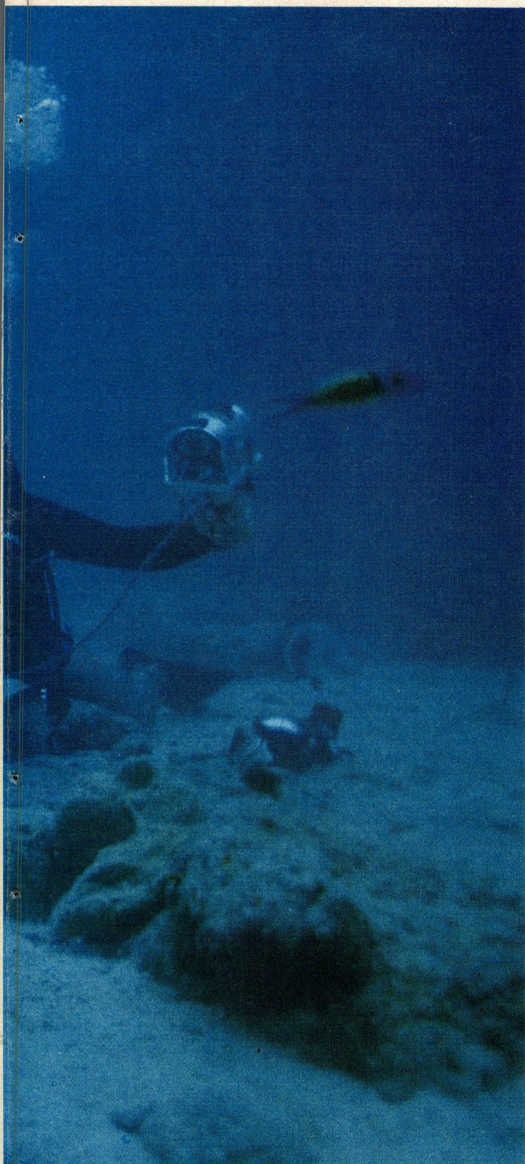


The question of this ancient Spanish cannon's origin is one of the mysteries concerning the wreckage on Elbow Reef. There is an unusual concentration of shipwrecks on this reef and no one seems to know the identity of the ships or when they went down.

While The Elbow is home for many sunken vessels, Old Wood Wreck offers the prettiest setting for UW photography. The number of fish is due to their daily feedings.



John Pennekamp Coral Reef State Park is more than just another Florida tourist attraction. It is the largest, best known, and most dived underwater park in the entire world. During its 15 years of existence, an estimated 1½ million people have dived or snorkeled its lovely living reefs. The park is 21 miles long, three to four miles wide, and covers 73 square miles of warm, clear Atlantic Ocean. There are perhaps one hundred or more dive spots within the park boundaries which offer superb diving opportunities and a myriad of marine life. Several locations have been well publicized, and names like Molasses Reef, Carysfort Reef, Benwood Wreck and Christ Statue are almost synonymous with Florida Keys diving. But there are lesser known spots which offer equally exciting diving



photography by Author

and perhaps a bit more mystery. One of my favorites is one called The Elbow.

The Elbow is a large, natural coral formation situated on the outer border of the Park, approximately midway down its 21 mile length. The reef sits very close to the edge of the Gulf Stream and, therefore, benefits from a slight current and consistently clear water. It lies 8¼ miles east northeast of Pennekamp's Park south cut, the main entrance to the Park used by the majority of Key Largo dive boats, and it is 5½ miles almost straight out from the Garden Cove Channel which is the base of operations for dive boats owned by American Diving Headquarters and by Steve Klem's Underwater Guide Service. Running time by boat ranges from 25 to 40 minutes, depending on surface conditions and the boat involved.

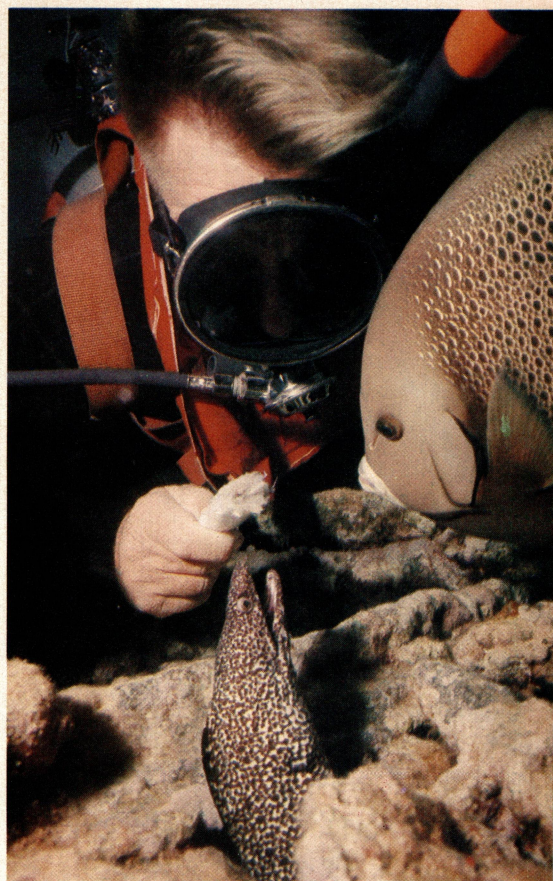
The reef is well marked by a 36 foot high steel tower which supports a navigational light. Divers in private boats or rental craft can locate the area with ease but it takes a professional dive guide to locate the exact position of Elbow's best spots, since the reef is so large.

Much of the bottom terrain surrounding the Elbow is low profile corals and flat sand bottom or coral gravel. Some of the coral ridges rise up from the bottom five or six feet and they run for one hundred yards or so with sandy channels in between. Although the coral formations are not as beautiful as those at Molasses Reef or Carysfort, there is a tremendous abundance of fish and marine life in this area. Large schools of porkfish or grunt can be seen cruising over the reef at almost any time of the day. And, directly under the legs of the steel tower, there lives a family of 20 large barracuda. Some of these impressive creatures look to be five feet in length and must weigh 50 to 60 pounds. A diver can obtain close-up underwater photos of these awesome fish if he approaches the tower slowly and quietly without making any quick or sudden moves. These 'cudas do not appear afraid of divers but they are a bit spooky of sudden movements.

One of the most fascinating aspects of The Elbow is the unusual concentration of shipwrecks on this reef. There is probably more wreckage on this reef than on any other single area of the park. It is believed that The Elbow is the final resting place for at least three ships and possibly more. It seems like every coral crevice and sand hole is littered with bits of coral encrusted metal and ship's rigging. It is a place of mystery and fascination for no one seems to know the exact identity of the ships which are sunk there — or when they went down — or how these sinkings occurred. All that remains is a vast storehouse of obscure clues which tweek the diver's curiosity and fire his imagination.

The wreckage of a large unidentified steel hulled ship lies in 20 to 30 feet of water, approximately 100 yards off the south side of the tower. Steel girders, bent piping and twisted portions of hull plate are strewn over more than an acre of the sea floor, indicating the wreck had either been dynamited or pretty well flattened by successive winter storms. It is believed that the hulk was a large refueling barge utilized during World War II and accidentally wrecked during transportation along the Florida Keys coast.

Today, it looks like a vast undersea junk yard, serving as a marvelous playground for both fish and sport divers. It is a popular spot for open water training dives, snorkeling tours and ocean certification checkouts. Because of the shallow



Above photograph shows Captain Klem and a spotted moray and gray angelfish, just two inhabitants of The Elbow who have been tamed through Klem's daily feedings. Below are schools of brightly colored reef fish, in this case, cottonwick grunts, commonly found on the reef.



water and openness of the wreck, it can be enjoyed by just about any kind of diver, whether a neophyte or a veteran undersea photographer. It is an ideal backdrop for underwater seascapes as there is a unique assortment of shapes and angles for good photography. The wreck is inhabited by a wide variety of reef fish, including the usual assortment of angelfish, parrotfish, butterfly, snappers and grunt. You can often find a scorpionfish or two snuggled into a crevice of the ship's ribs taking his usual noonday snooze. Nearby is a large ocean triggerfish which often follows the divers from rock to rock. He is quite tame and has actually been handfed by Captain Steve Klem, one of Pennekamp Park's masters at fish feeding. Another "friendly" who often frequents the wreck is a good sized hogfish who has also learned to take food from the diver's hand. Both the ocean trigger and the hogfish love to dine on chopped sea urchins and the mere act of chopping one up with your knife is enough to bring them running.

A hundred yards to the west of the large steel wreck, there lies a very old cannon, resting in a sandy area between

two coral ridges. It is approximately six feet in length and heavily encrusted with coral and iron oxide. The cannon is resting on a large rock and in a horizontal position as if ready to be fired. There is no ballast stone or other evidence of a shipwreck anywhere in the immediate vicinity — just the one single solitary cannon. The ancient gun is reputed to be a Spanish cannon from the late 17th or early 18th century and may possibly be from one of the many treasure galleons known to have crashed onto the Florida Keys reefs. It is quite a mystery as to how this one cannon came to be lying on Elbow Reef. The local scuttlebutt is that one of the old Key's guides brought this cannon to Elbow as an undersea attraction for visiting divers. And somewhere nearby, perhaps only a mile away, lies the rest of the cannon and unrecovered cargo from this mystery treasure ship. The exact location of the galleon is known only to the donator of the cannon and he's not telling anyone anything — he's not even telling his name!

Approximately 100 yards north of the tower lies the remains of a wooden hull ship, also of unidentified origin and vin-

tage. It is sitting in 27 feet of water on a flat sand and hard gravel bottom. This wreck appears to be quite old as it is completely covered over with coral encrustation, seaweeds and large seafans. However, a large section of the ship's heavy wooden beams and bulkhead are still visible even though half buried on the sea floor. There is also row upon row of bronze fastening pins still visible where they once held down sturdy wood plank decking and heavy bulwark. The wreck has a number of different names, depending upon the guide who is leading the tour. Some guides call it the "Civil War Wreck" while others refer to it as "No Name Wreck" or just the "Old Wood Wreck."

Although this wreck is quite small in size, it is loaded with fish and other marine life. A large school of cottonwick can be found resting between the ship's beam while a school of small mouth grunt are often cruising over the top of the wreck. Two large gray angelfish can be seen at the wreck almost any day and they are exceptionally tame and can be easily hand fed by any visitor. Other species that will respond to food offer-

Author of the fish feeding guide, Training the Untamed, Capt. Klem has special feeding techniques.

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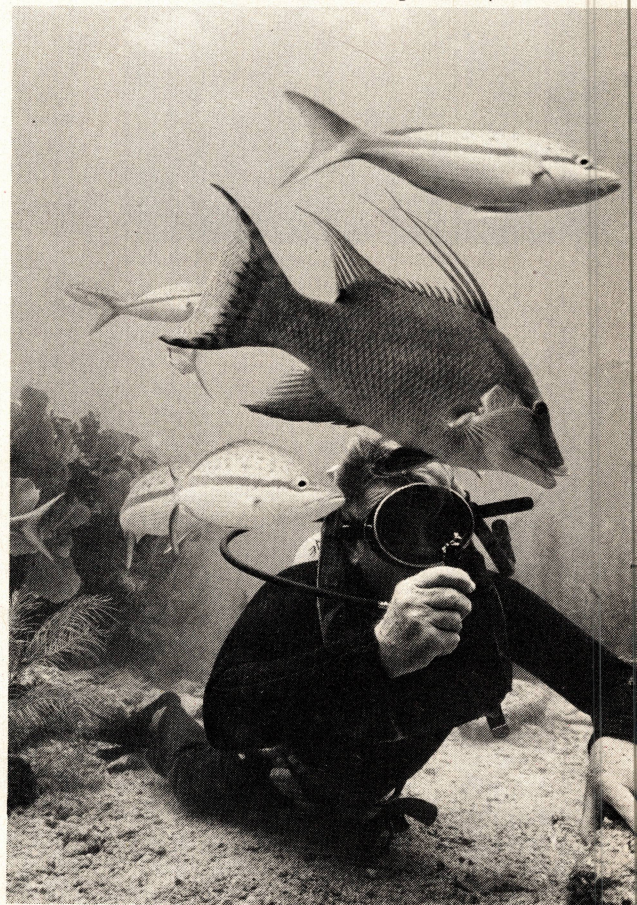
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ings include: yellowtail snapper, black margate, French grunt, gray snapper and a juvenile French angelfish. The unusually large concentration of fish on this wreck and their friendliness toward divers is primarily due to the daily feedings conducted by Captain Steve Klem. Each and every day Captain Klem arrives at the wreck with a bagful of frozen ballyhoo or mullet, happily distributing these choice morsels among his many "sea children." Noted author of the fish feeding guide, *Training the Untamed*, Captain Klem has developed special and unique methods for taming and feeding just about any species of fish to be found within Pennekamp Park.

One of the main attractions of the Wood Wreck are the dozen or more moray eels which inhabit the jumble of rocks and timbers. The predominant species is the smaller spotted moray which ranges from two to three feet in length. This particular species of eel is usually quite docile and has an ideal temperament for feeding. Captain Klem has made friends with just about every eel on the wreck and knows them individually by various scars and color mark-

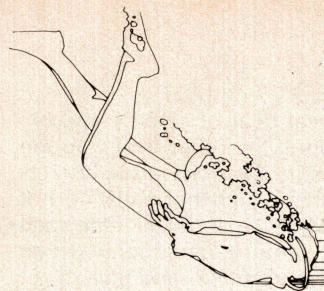
ings on their bodies. Captain Klem claims that eels are very much like people in that each has its own individual personality. Some simply tolerate the presence of a diver while others seem to express an unusual degree of friendliness and can be fed at closer range. However, Captain Klem warns that divers should not attempt to feed eels by hand unless under the supervision of an experienced undersea guide who knows the habits and reactions of the creature being fed. In addition to the spotted morays, there are one or two larger green morays which live deep inside the wreckage. One of them is estimated to be seven or eight feet long but he is seldom seen. The green morays are rather shy and retiring, requiring considerable patience and coaxing before they will take food. Another species of moray found on the wreck is a small chocolate brown creature measuring less than two feet in length. Although this little fellow has a small mouth, he is a voracious feeder and possesses a rather nasty disposition. He is regarded as the most difficult of all the morays when it comes to feeding. The eel feeding activity by Captain Klem usually

induces a great deal of activity and excitement among the other fishes on the wreck. This stir of activity often attracts other creatures which normally do not feed in the presence of divers. One such creature is a medium size stingray which often comes in from the sand flats to get his share of free food. Most divers are shocked when they look up to see a stingray munching on frozen bait fish right along side the angelfish and moray eel! Every once in a while, a large amberjack, yellowtail or other pelagic species will zoom in for a quick morsel before continuing its random cruise of the outer park perimeter.

Whether your interests lie in wreck exploration, fish feeding, or undersea photography, The Elbow is certainly a place not to be missed on your next visit to Pennekamp Park. It is the kind of a spot which offers something for everyone, including a little speculation about the origin of its many wrecks and the location of one mysterious Spanish galleon. For more information and prices on dive trips to Pennekamp Park locations, contact any one of the below listed diving operations. 🐠

Lying in 27 feet of water on a flat sand and hard gravel bottom is the remains of a wooden hull ship. A large section of the ship's heavy wooden beams are still visible, as well as row upon row of bronze fastening pins. Some call this wreck the Old Wood Wreck.





New's Briefs

By Hillary Hauser



SHARK MEET

In November of '75, a NOAA sponsored shark conference took place in Orlando, Florida, that attempted to zero in on the realities of the shark problem, if there is one. Because coastal communities with a stake in tourism have been under considerable pressure from the public, NOAA decided to step in. The idea of the conference was to "restore some semblance of public confidence in the beaches as well as to come up with some means of control for water users and commercial fishermen." As we heard it through *Ocean Science News*, the conference highlights were: assessment of the problem, including the shark impact on industry; review of anti-shark measures and behavior patterns; exploration of commercial utilization; consideration of legal liabilities; identification of problem areas for future research. While the conference was not expected to come up with any earth-shaking conclusions, it was thought that it would at least produce new information as well as ease the public mind about a subject which in recent months has been largely over-sensationalized. We'll pass along any facts that come out of the meet.

WHERE'S TED?

In November we wrote about Florida inventor Ted Miller, who had invented a revolutionary small diving tank but who is seeking backers for his product. We have received letters from interested backers, but have no address for Ted Miller. The only clue we have is that he owns a marine service shop in West Palm Beach. Can anyone help?

WORLD FIRST IN MUSIC: THE AQUALIN!

Mark Gottlieb has an unusual ability for putting things together. He dives and he plays the violin, so he decided to do them both at the same time. First, Mark bought a \$15 violin and a can of marine varnish. He took the violin apart and varnished every inch of it, "at least twice." He reassembled the fiddle with strong glue and tried it in the bathtub. "It sounded rotten," Mark recalls, "but it did work."

Mark then graduated to the swimming pool at the Evergreen State College in Olympia, Washington, where his father is a music professor. "I was filled with joy as I started the first notes," writes Mark. "I heard every note from the lowest string to the highest string." However, Mark discovered that the violin could not be tuned, since the tuning pegs expanded underwater, and that the sound did not travel more than five feet. To solve these problems, Mark used one of his better violins and an electronic amplifier that could be hooked to the instrument underwater but remain on dry land. He waterproofed the microphone and attached it to the sounding board of the violin. He borrowed a speaker to use above water. The results were "fantastic." He then called into play an underwater loudspeaker which he had made two years earlier. The sound from the U/W violin was sent up to the amplifier above water, and from there back down to the loudspeaker underwater. "Aqua-Stereo!" exclaimed Mark triumphantly.

The Aqualin has met with huge success. Last year, the *McGuinness Book of World Records* included Mark and his Aqualin in their bible of firsts. There was even talk of Mark appearing on the "David Frost Presents the Guinness Book of World Records." Meanwhile, Mark kept working. He solved his tuning problems with mechanical pegs and his underwater sound now reaches 75 feet. The last thing we heard about the inventor and his invention was that he was featured on a BBC broadcast called "Record Breakers." He was flown by the network to Bermuda, where they filmed him playing away. His selection? Handel's "Water Music."

SUB-VERSION TOLD

Last year a Senate intelligence committee initiated a six-month investigation into CIA involvement in assassination attempts against foreign leaders. In November the 346 page report came out and among the findings of the panel were "concrete evidence of at least eight plots" involving the CIA to assassinate Fidel Castro from 1960-1965. The plots "ran the gamut from high-power-

ed rifles to poison pens, deadly bacterial powder and other devices which strain the imagination." Two of the most bizarre plans were developed in 1963 by CIA's Task Force W. One involved the placement of an exotic seashell, rigged to explode, in an area where Castro commonly went skin diving. Another scheme was to present Castro with a contaminated diving suit. Both plans were abandoned.

FATHER RETIRES

Capt. George F. Bond, the "Father of Saturation Diving," has retired from the Naval Coastal Systems Lab at Panama City, Fla. Bond is responsible for the development of ascent and decompression schedules, the use of no-decompression dives, and oversaw the first dive in a wet chamber to 1025 feet. More recently he demonstrated the feasibility of free ascents, or escapes, from more than than 300 feet. He was instrumental in the Navy's Man-in-the-Sea program, and was senior medical officer in the Sealab projects. He was senior project medical advisor for the Helgoland project off Maine in Sept. of 1974. At NCSL, he was the commanding officer's special assistant for diving medicine.



TO THE DRINK

A gold-seeking expedition led by British Royal Navy Commander John Grattan left New Zealand last fall to salvage the gold bullion from the American ship, *General Grant*. The 1100 ton ship sank in May, 1866, in Auckland Islands with \$40 million aboard. Out of 18 previous salvage attempts on the *Grant*, 29 persons have died. Asked how the gold-seekers would feel if there was no gold, Grattan answered, "It would be heart-breaking and we would get drunk."

PLANE SALVAGE

Robert Nichols, 26, and his brother, Don were aboard their 65 ft. party fishing boat out of So. Haven, Michigan, last June, when they saw an awesome sight. They were off the mouth of Deerlick Creek, Lake Michigan, fishing for yellow perch when one of their customers spotted an ex-Navy fighter streaking north over the 50 boats anchored in the vicinity, only 25 feet off the water. Suddenly it crashed. Fishing lines were immediately hauled in and the Nichols headed their boat *Whitby*, to the crash site.

The plane was a WW II Grumman Wildcat piloted by Frederick W. Edison, a Kalamazoo dentist who was accompanied by his stepson John Stiles. Both were unhurt. Bob, who has his own diving company, Subsea Specialists, was called for help by Edison, and immediately went into action. With air bags and slings, the Wildcat came to the surface and was lifted from the water the next day. (Photo, by Tom Renner, shows salvagers, L to R, Ed Foster, Mike Maihofer, Harold Linden and Robert Nichols at work.)



OOPS!

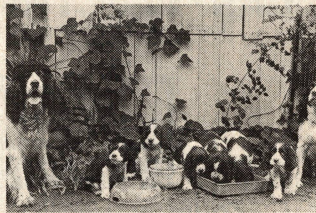
In January we told of a publication "Downstream," a report on a diving industry meet at Commercial Diving Center, Wilmington, Calif. That report was not programmed for public use, and in fact is not even called "Downstream". However, CDC periodically holds similar seminars which are open to the public, and invites inquiries. For information write CDC, 272 So. Fries Ave., Wilmington, Calif. 90744.

3 FOR THE GULF

We don't have a date yet for this unusual event, but the word has just reached us that Neil Watson, Dimitri Rebikoff, and Bob Marx will attempt to cross the Gulf Stream underwater. The trio plans to swim from the Rebikoff Institute in Bimini to the First International U/W Exposition at Dinner Key, Miami. Heavy metal cages will protect them from underwater hazards (presumably sharks). A press release from the Rebikoff Institute states that the feat is "intended to be a clear demonstration of how easy it has become to conquer long distances in the water, while remaining reasonably safe from supposedly hostile marine life."

DIVER BREEDS

Mac, the diving dog from Santa Barbara, Calif., who has delighted underwater film festival audiences across the country with his filmed diving exploits, recently sired six little canine water enthusiasts. Mac (left, with hat) is owned by charter boat skipper Glenn Miller, who put his famous diving pooch together with Mona (far right), and together the two Springers came forth with a half dozen potential divers. (Photo by Chris Swann.)



DOLPHIN RIGHTS

Legally enforceable civil rights for dolphins? Yes! according to Dr. John C. Lilly, well-known author of the best-seller *The Mind of the Dolphin*. "What we are proposing," says Lilly, "is that dolphins and whales are intelligent species and that they should be included in the United Nations Bill of Rights." Two lawyers associated with Project Jonah, are already examining the legal aspects of such rights, and a case is pending. If successful, dolphins and whales could not be exploited for entertainment purposes, Lilly points out, nor for any other commercial or industrial purpose. They would have complete legally enforceable civil rights of suit, with court appointed attorneys acting in their behalf.

ODDS & ENDS

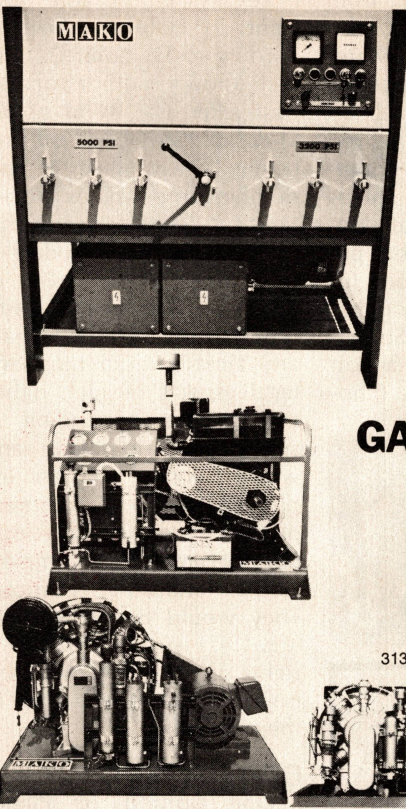
One portion of Planet Ocean, Miami, officially opened Dec. 15 - the part with two major theaters, three mini-theaters and 100 exhibits . . . The John Marshall High School Scuba Club in Milwaukee, Wis., is obtaining a two-man dry sub for aquatic research in Lake Michigan for fall and summer 1976 . . . Sea Farms, Inc., Poulsbo, Wash., was forced out of business by pollution. Great amounts of oyster larvae were killed by a combination of civilian and Navy wastes dumped into Liberty Bay . . . Two Calif. divers were caught stealing lobsters from a commercial trap and were sentenced to ten days in jail by a San Diego judge. The lobsters found in the divers' possession had been secretly marked in advance and placed in the trap . . . A Society of Marine Sciences has been formed in Malaysia, c/o University Sains Malaysia, Pulau Pinang, Malaysia . . . The Russians have built a new unmanned submersible *Kayman II*, a towed vehicle using television to study the ocean bottom. The new craft can go to 600 meters.

DIVING INDUSTRY PROBLEMS AIRED

The diving industry took a direct look into its problems at the Labor Dept's Occupational Safety and Health Administration (OSHA) meeting last fall. According to *Ocean Science News*, Capt. Albert Behnke, U.S. Navy (ret.) suggested that regulations pertaining to safety be implemented immediately and noted that about 2-3% of operational dives result in decompression sickness. Dr. Eric Kindwall, director of the Dept. of Hyperbaric Medicine at St. Luke's Hospital in Milwaukee, commented, "Fortunately, in this situation we have something to go to, the *Manual on Safe Practices in Commercial Diving*, published by the Association of Diving Contractors (ADC). Kindwall also supported a standard. J. J. Carroll, founder of J & J Marine Diving Company, also called for a standard and said that the ADC manual was a watered down Z-135 report and not adequate. Andre Galerne of Intl. U/W Contractors, N. Y., predicted 1000-2000 ft. dives and called for more safety information to avoid tragedy. Galerne commented, "We seem to think the whole problem is diving tables. I do not know of any death in the last ten years due to (inadequate) diving tables." Galerne recommended that U.S. Navy tables not be made mandatory for industry, since they are designed for a different kind of diving - requiring large support teams that are financially unfeasible in commercial situations.

Dr. Peter Bennett, Duke U., and President of the Undersea Medical Society, said "It may be impossible to develop a table that will produce no bends," but suggested that scientists do not know what bends really are. "Bubbles do not mean bends," Bennett explained, adding that it was possible to have one without the other. Bennett, who has pioneered new deep diving tables to 1000 feet and beyond, said that compression tables were needed as well as decompression tables to avoid High Pressure Nervous Syndrome (HPNS). Bennett also added that it would be wrong at this point to set fixed decompression procedures in any OSHA regulations, but that U.S. Navy tables would not be acceptable, especially for mixed gas use.

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Buoyancy Compensators

(Continued from Page 47)

bag of the BC to allow trapped air to escape from between the two bags. Dacor's Seachute features two bladders inside an outer nylon bag — one for the CO₂ method of filling the vest and the other for the air system.

Generally, these bladder vests are soft and pliable too, making them very comfortable to wear around the neck. This may be an important consideration especially if you are diving in tropical water and not wearing a wet suit or shirt of any type. Most of the BC's weigh between two and three pounds.

Lift capacity — In this department, the basic concept of a BC has gotten a little out of hand. Just because one BC provides a greater amount of lift than all of the other units on the market is no reason to buy that particular model. In conversations with Jon Hardy, General Manager of NAUI, Dennis Graver, National Training Director of PADI, and Dr. Glen Egstrom of the Sea Grant Diving Safety Research project at UCLA, each had different ideas on what the ideal lift capacity should be, but all agreed that there is no reason to have anymore than 50 lbs. of lift. Dr. Egstrom pointed out that an average person's head weighs around 17 lbs., and if he dives neutrally buoyant (at the surface), a lift capacity of 17 lbs. would be adequate, so a BC with at least 18 to 20 lbs. of lift would be a good choice.

Dennis Graver felt it should be twice that amount to support two divers at the surface, and Jon Hardy felt that somewhere between 25 and 50 lbs. was ideal. Jon pointed out that with upward of 50 lbs. of lift, novice divers have difficulty controlling the unit at depth. Dr. Egstrom questioned, "What do divers want to lift with it? If it's going to be used as a lift bag for anchors, then more lift would be required. If it's to be used for what it's designed for — a buoyancy compensator — one hardly needs 50 lbs. of lift capacity."

It's interesting to note that these three experts have slightly differing thoughts on the subject, but keep in mind that as there are different designs in each BC shown here, there will also be different diving situations that might require different amounts of lift. It all boils down to your personal preferences and needs. You could have ten highly qualified instructors all wearing different BC's and each would tell you that for his diving style and needs, he has chosen the model that suits him best. The bottom line is "be comfortable."

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DIMENSION 2

under the direction of Dr. Egstrom, placed a 70 lb. weight on the bottom of the UCLA pool, attached a scale to the weight, and secured the BC to the scale and inflated it. We then read off pounds of lift of each buoyancy compensator. The results are in the chart:

MEASURED LBS. OF LIFT IN FRESH WATER

AMF SWIMASTER	42
DACOR	42
HEALTHWAYS	38
SCUBAPRO	42
SEAQUEST (Fenzy)	27
SEAQUEST (M-90)	27
SEATEC (BC-V)	43
SEATEC (BB 301)	15
SPORTSWAYS	42
U.S. DIVERS	42
WHITE STAG	34

Filling and exhausting of BC —

When a diver finds himself in an emergency situation, he's going to want to fill the bladder or bag as quickly as possible. We also measured this underwater at a depth of seven feet and came up with the figures in the following chart. An understanding of Boyle's law illustrates that if a vest holds 3/4 cu. ft. of air at the surface, at 33 feet, the BC will hold twice that amount, or 1 1/2 cu. ft. Each succeeding atmosphere in depth would require an additional 3/4 cu. ft. of air to maintain the surface vest volume of 3/4 cu. ft. At a depth of 99 feet, or four atmospheres absolute, it would require three cubic feet to fill the vest. However, it should be understood that unless a diver is very much overweighted, he won't require the vest to be filled to capacity to bring him to the surface. Often, just a quick spurt of air will be enough to begin the ascent.

And that brings us to the potential of rising too fast when the air in the BC expands during ascent. It is more critical for the diver to be able to purge the vest of air faster than what it would expand during an ascent. We therefore measured the time it took to completely dump the air from each BC, also at a depth of seven feet. Following are the results:

TIME IN SECONDS

	To Fill	To Exhaust
AMF SWIMASTER	3	8
DACOR	8	22
HEALTHWAYS	7	10
SCUBAPRO	15	9
SEAQUEST (Fenzy)	4	4
SEAQUEST (M-90)	6	6
SEATEC (BC-V)	14	10
SEATEC (BB 301)	4	5
SPORTSWAYS	7	8
U.S. DIVERS	9	3
WHITE STAG	8	7

Again it should be pointed out that it would be unusual for a diver to fully inflate his buoyancy compensator while underwater, so a partially filled BC would of course, empty faster than what is indicated in the chart. But there have been instances where a diver fully inflated his BC while hanging onto a heavy

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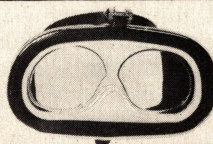
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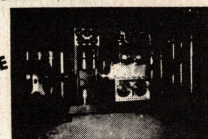
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Buoyancy Compensators

object expecting to raise it up off the bottom, then inadvertently dropped it and shot for the surface. In a situation like that it could be very dangerous if he couldn't dump the air fast enough to adequately slow his ascent rate.

OVERPRESSURE RELIEF VALVES

As important as a method to mechanically introduce air into a BC is, it is equally important to have an effective overpressure relief valve to blow off when the vest is filled to capacity, so it won't rupture. Basically, all of the valves work on the same principle. They have an opening over which a plastic and rubber plate is held closed by a spring. This spring is designed to give when the air pressure in the vest has reached a certain psi. Generally it is around one and a half to two psi before this valve will open. All of the valves can be taken apart for cleaning and inspection. U.S. Divers' overpressure relief valve is one and the same with the dump valve. None of the vests could be filled fast enough to override the effectiveness of these valves. The Seatec BB-301 also features a pull cord to operate this valve prior to the vest reaching full capacity.

OTHER DESIGN FEATURES

Basically, we've covered the important points that all divers should be concerned with when selecting a buoyancy compensator. However, as with everything and anything, when one can buy where there is more than one model to choose from, oftentimes it's the little things that determine one's choice. Following are additional features to take into consideration.

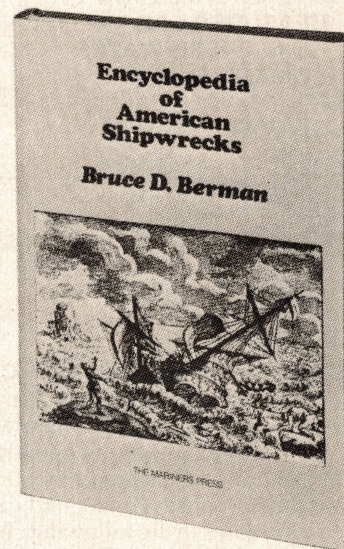
Drain plugs and drain holes —

When using a double bag BC, water will collect between the two bags, and when a diver surfaces and starts to get out of the water, the water between the two bags must run out. The more holes and the bigger the holes along the bottom of the vest, the faster the water will be eliminated. Dacor's Seachute features a drain plug in the air bladder to drain water from it when in the hanging position. The Fenzy has a large 3/4" drain cap to allow complete flushing out with fresh water and drying of the interior of the bag.

CO₂ cartridge — Six of the BC's also come equipped with a CO₂ cartridge. The Seatec BC-V model has two 16 gram cartridges. For many years, the pot metal cartridge assemblies on CO₂ vests weren't worth the material they were made of. They corroded easily and broke becoming more often than not, totally useless. Now, all of the manufacturers of these BC's have switched to a Roberts

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detonator which is a tremendous improvement. The CO₂ cartridges can be considered an effective emergency back-up system to be used at the surface for instant inflation. After each day's use, these should be taken out and the mechanism and cartridge sprayed with silicone prior to putting them back together. A word of caution: Be sure the BC has been purged with air prior to using the oral inflation tube. Getting a breath of CO₂ at depth could be uncomfortable, if not disastrous.

Harness straps and snaps — These are almost as varied as there are BC's. All of the BC's in this article, except for Scubapro's and Seatec's BB301, feature crotch straps that run from the highest part of the BC at the back of the neck, down under the crotch, and snap into place at the lower front part of the bag. Scubapro's connects from the back of the waist strap. The straps should be adjusted with the BC completely full of air, otherwise you are liable to experience an awful crotch squeeze. Likewise, the waist strap should also be adjusted with the buoyancy compensator full of air.

One snap system that is worth mentioning here is White Stag's. This BC features a plastic push lock snap that is extremely easy to connect. However, when wearing gloves or especially heavy mitts, the snap is difficult to undo. But then most divers usually take their gloves off prior to doffing their equipment.

Pockets — You'll see from the chart that some of the BC's have pockets for carrying accessories. In all cases, these pockets are expandable and are held closed with velcro. They are especially ideal for carrying decompression meters and any other small items that a diver may require underwater. To prevent losing the meter it's a good idea to tie a cord to it and attach the cord through a drain hole in the pocket.

Whistles — The Fenzy, White Stag, Scubapro, and Dacor's Seachute, all come with whistles attached to the oral inflation hose — a great idea for getting someone's attention at the surface.

Triple bag construction — Dacor's two bladder Seachute is unique in that one bladder is used strictly for the air supply and the other is for the emergency CO₂ inflation system. Both bladders also have separate oral inflation tubes and separate overpressure relief valves.

Oral inflators — Most of the BC's feature two buttons on the oral inflator tubes — one for mechanical inflation and one for exhaust. If a diver mistakes one for the other, he'll immediately recognize it because air being expelled sounds a lot different than air going into the BC. Dacor has simplified their exhaust system by making it one and the same with the oval mouthpiece. However, one should be careful not to put one's thumb over the end of it when attempting to dump air because it will block the opening completely.

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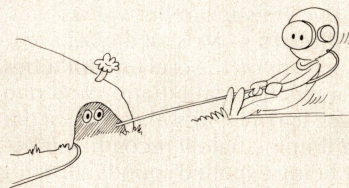
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Buoyancy Compensators

SOME POINTS TO CONSIDER

- 1) The buoyancy compensators shown here are only 12 of about 26 that are available on the American diving market. However, they represent the top of the line of the BC's from each manufacturer, or where there are two from one company, the second one has been selected for size. Other manufacturers may have additional models that would best fit your budget and needs. Send for their catalogues, or ask to see these BC's at your local dive store. Be judicious in selecting the one that would work best for your diving needs. What will be the ideal BC tool for a Florida reef diver will not necessarily be the best choice for a New Jersey wreck diver.
- 2) Regardless of what BC you choose, it should have some method of being filled mechanically. The place for a diver's mouthpiece is in his mouth. It is incompatible with good sense to remove it underwater. The time and effort in oral inflation might expend as much air as the simple, uninterrupted act of using the direct inflation of a low pressure hose connector or a separate bottle.
- 3) Be sure the BC is compatible with your scuba system. Is the low pressure hose long enough, and does it come off the same side of your body as the LP outlet from the first stage of your regulator?
- 4) Does the BC fit? Obviously a 100 lb. woman diver shouldn't be using a BC with a lift capacity of 42 lbs. A smaller one would be more comfortable for her to wear and use.

Remember, the buoyancy compensator is no longer to be considered an accessory. It is a standard piece of equipment. Every instructor worth his salt should be teaching its use and every diver should be diving with one!



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California Legislative Alert

On December 5, 1975, the California Fish and Game Commission held hearings in Sacramento for proposed changes in the 1975-6 Fish and Game regulations. Among the changes was an amendment initiated by local San Diego commercial lobstermen which would have limited the hours that the spiny lobster could be taken by sport divers. According to the proposal, divers would not be allowed to take lobster between the hours of midnight and sunrise.

This attempt to limit sport take of lobster was thrown out by the Commission. They received 295 letters, 35 petitions and several phone calls.

However, abalone bag limits didn't fare as well because there wasn't enough warning to get the word out. Bag limits will be reduced from five to four. Furthermore, the season north of Yankee Point (Monterey County) will be reduced to April, May, June, August, September, October and November. Originally it was recommended that both July and August should be closed. Appeals got August restored as an open month.

Many people should be commended for their prompt action — their letters, petitions, and phone calls — as well as those who made personal appeals to the commission in Sacramento. Their hard work did the job!

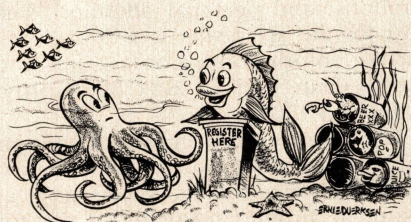
New Dive Film

Jade Productions has been selected by BayleySuit Company of Eureka California to produce a 25 minute documentary. The film will be used both for video cassette courses and entertainment for diving courses.

To be shot on location in Studio City, California, and Avalon, Catalina Island, in mid-February, Myles Harmon produces and directs, Lee Bryant stars, and Jim Ashenbrenner, technical adviser.

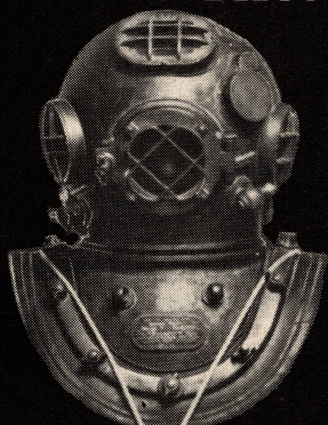
BayleySuit Company is a large manufacturer of wet and dry dive suits and also makes ski equipment.

For further information about this documentary, contact: BayleySuits, Inc., 900 S. Fortuna Blvd, Fortuna, Ca. 95540.



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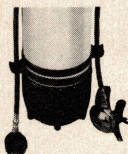


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Divers' Seminars

Spanish Bay Reef is offering several seminars of special interest to divers in 1976.

From June 4-15 will be the Marine Biology Course for Divers. This will be the fourth summer for this highly successful course, offering college credit from the University of California, San Jose. The instructor is a certified scuba diver, undersea photographer, and Ph.D. in marine biology. No previous study in biology is necessary. Slides and lectures, daily, plus a full schedule of guided diving are all features of this course. The cost is about \$725 for 11 nights. For further information, contact: Dr. Steve Webster, Dept. of Biology, University of California, San Jose, Ca.

From June 16-27 will be the Intermediate Marine Biology Course for Divers. The beginning biology classes have proven to be so popular, that the Sierra Club is offering an intermediate course for the first time this year, designed for the graduates of the biology course previously described, or for those persons

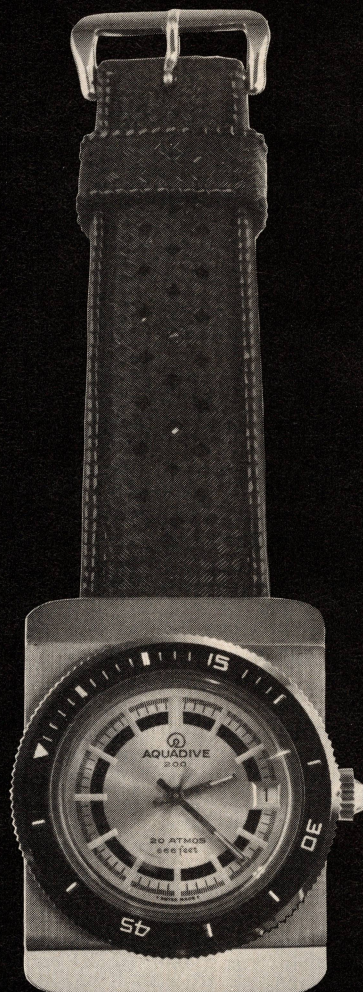


with some previous background in biology or zoology. College credit is available. Divers wishing to learn a great deal in a short time are invited to come for both classes, back to back. The cost is approximately \$725 for this course, though there will be a discount for those taking both classes. Eleven nights. Contact Dr. Steve Webster, as the aforementioned suggested.

The last course, Underwater Photography with Jim and Cathy Church, will be offered July 3-9, July 11-17, July 24-30, and August 1-7. Their fourth summer at Spanish Bay Reef, the Churches will be teaching beginning/intermediate subsea photography. A complete line of rental equipment is available, plus on the spot, instant processing of color film. This course also features lectures, slide shows, both above and below water demonstrations, and personal attention. The cost for the six nights is \$497.10. For further information, contact Jim and Cathy Church, P.O. Box 80, Gilroy, California 95020.

The prices quoted include double or triple occupancy room, three meals, two daily dive trips, tanks, guide service, return to airport, instruction. Costs for accompanying non-students furnished upon request. Inquiries may also be sent to: Spanish Bay Reef, P.O. Box 800, Grand Cayman Island, B. W. I.

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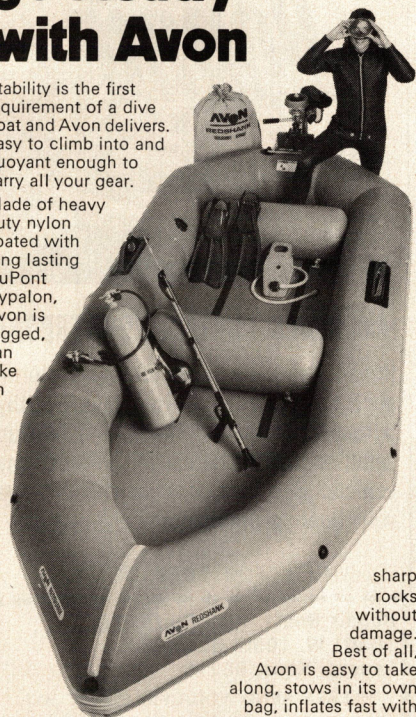
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The two ships, the American armed schooners *Hamilton* and *Scourge*, were used in the War of 1812. The wrecks were found by a research team from the Royal Ontario Museum and the Canada Centre for Inland Waters. Dr. Daniel Nelson, leader of the expedition, observed, "It's an amazing find".

The Hydroscan sonar charts clearly reveal that the ships are standing "upright on the bottom, guns on deck, with the masts, spars and bowsprits still in position". The narrow sound beam of the Klein Side Scan Sonar creates an acoustic shadow which brings out these details.

Klein Side Scan Sonar is used around the world in a wide variety of applications. In addition to locating shipwrecks, it is used to locate pipelines and cables on the sea floor. Hydrographers use it to find under-sea obstructions. Scientists are using it to map icebergs and iceberg scouring. Recently, several Hydroscan systems were used to assist in clearing the Suez Canal.

Reproductions of the Klein Side Scan Sonar recording may be obtained by contacting Klein Associates, Route 111, R.F.D. #2, Salem, New Hampshire 03079.

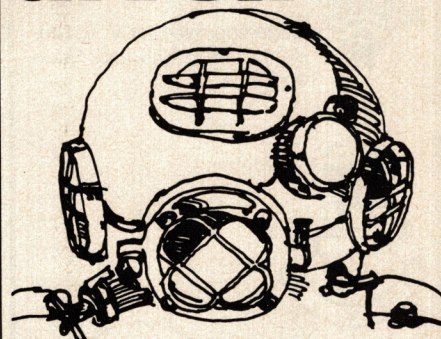
USC Sea Grant

The University of Southern California Sea Grant will begin the Underwater Natural History Class for Recreational Divers, a weekend class at Catalina Island, California. The weekend experience begins on a Friday afternoon when divers are flown Air Catalina from San Pedro to the USC Marine Laboratory at Big Fisherman Cove on Catalina Island. Participants will enjoy classroom and laboratory experiences with competent marine biologists, introducing them to the fundamentals of marine natural history as it pertains to the shallow waters of Santa Catalina Island, and approximately ten hours of diving under the guidance of master divers.

This program is offered on: April 23-25, May 21-23, June 25-27 and July 16-18. A special underwater photography class will be conducted on June 11-13. The total cost of \$135 (\$10 extra for the photography class), for the weekend, includes air transportation, board and room for two days, instructors and written materials, part of the equipment (back pack, tanks, weights and belts) and a certificate. All participants must be under current certification with a minimum age of 14.

Registration may be paid by Master Charge, Bank of America or check (no check earlier than one month before class), mailing registration to: U.S.C. Extension Division, Rm. 355, Adm. Bldg., University Park, Los Angeles, Ca. 90007. For further information you may write to the above address or call: (213) 746-2413 or 6068.

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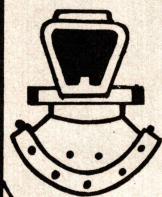
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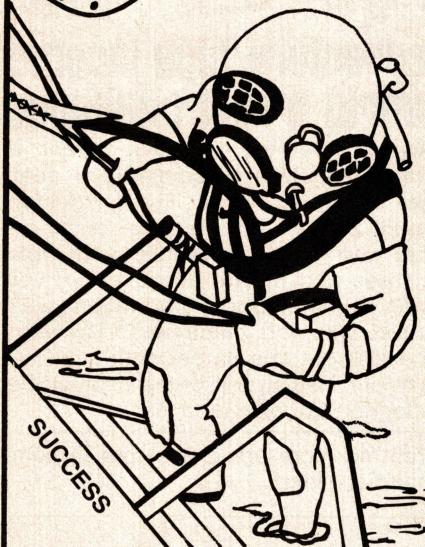
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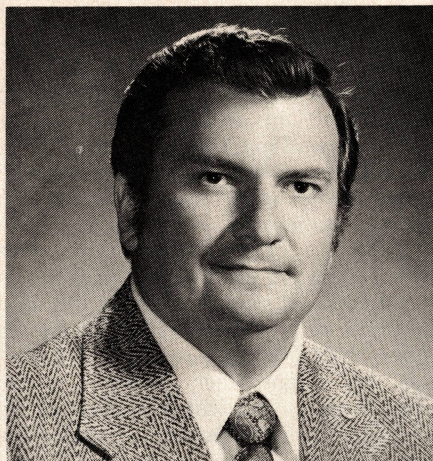


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Ullrich Joins CDC

Arthur H. Ullrich, Jr., well known in the diving world for many years as General Manager for the National Association of Underwater Instructors, has joined the staff at Commercial Diving Center, Wilmington, California as CDC's Training Director, it was announced recently by Jim Joiner, Executive Director for CDC.



As Training Director, Ullrich will be responsible for the organization and planning and implementation of all CDC courses to the best advantages of both the student and the diving industry.

Ullrich brings to his new position a vast scope of experience in the fields of diving and all phases of instruction and training.

Ullrich was certified as diving instructor #601 by NAUI in 1964. At that early time in diving instruction history, because he felt there was room for much improvement in properly training diving instructors, he was immediately drafted into practical activity in this respect by the association. He was made Pacific branch manager in 1966 and worked intensively in the areas of instructor training and evaluation. Art worked virtually unassisted in those days but provided the type of management that led to a 33% growth for the organization by 1969, at which time he was promoted to become NAUI's first fulltime professional general manager.

In further explaining the importance of top-rated graduates from CDC Joiner went on to say that deep sea diving training curricula must keep abreast of the fantastic and sophisticated scientific breakthroughs which now permit the introduction of humans into depths four to five times the operational depths of yesterday. Because of this, industrial diving today looks to a more highly educated employee. In just three years, the average CDC student's college educational level has doubled. The number of men with college degrees has jumped from 9.5% in 1972 to 17.8% today.

To find out more about the programs available at CDC today, write to the Commercial Diving Center, 272 So. Fries Ave., Wilmington, Ca. 90744.

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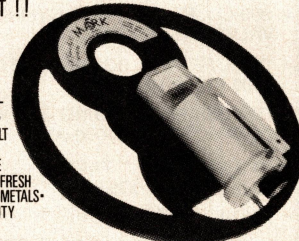
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Cetta has a vast background in the field
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USA Appoints Drake

Russ Thompson, President of the Un-
derwater Society of America, announced
the appointment of Harold Drake as the
new Executive Secretary of the Society
and the change of the Society Headquar-
ters to: 732 50th Street, West Palm
Beach, Florida 33407.

Drake, a past NOGI recipient, one of
the Founders of Florida Skin Diving As-
sociation and past President for many
years of this (one of the oldest councils of
diving clubs) has distinguished himself
as a leader in diving. He is well known
nationally as a representative of the indi-
vidual and club diver. He has great ex-
perience in dive legislation problems
and the attacks on dive freedom for over
20 years.

Drake is not a newcomer to the Society
executive area, for he has been a dele-
gate to the Board of Governors for many
years and has held the position of Treas-
urer and Director of Membership in re-
cent years. He is the first person to hold
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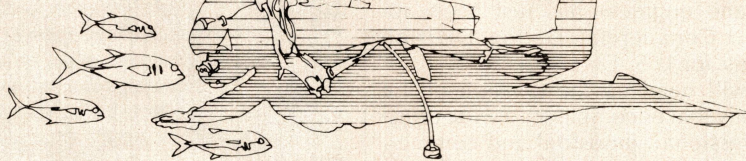
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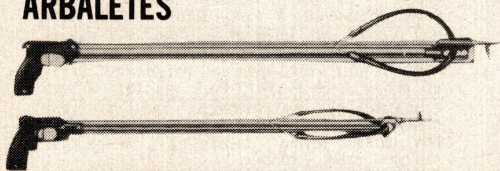
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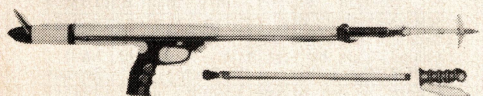
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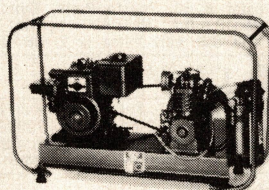
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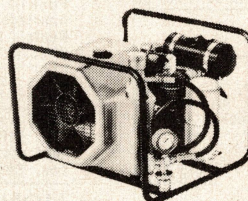
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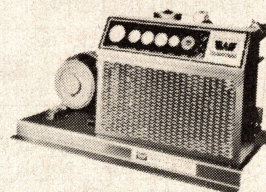
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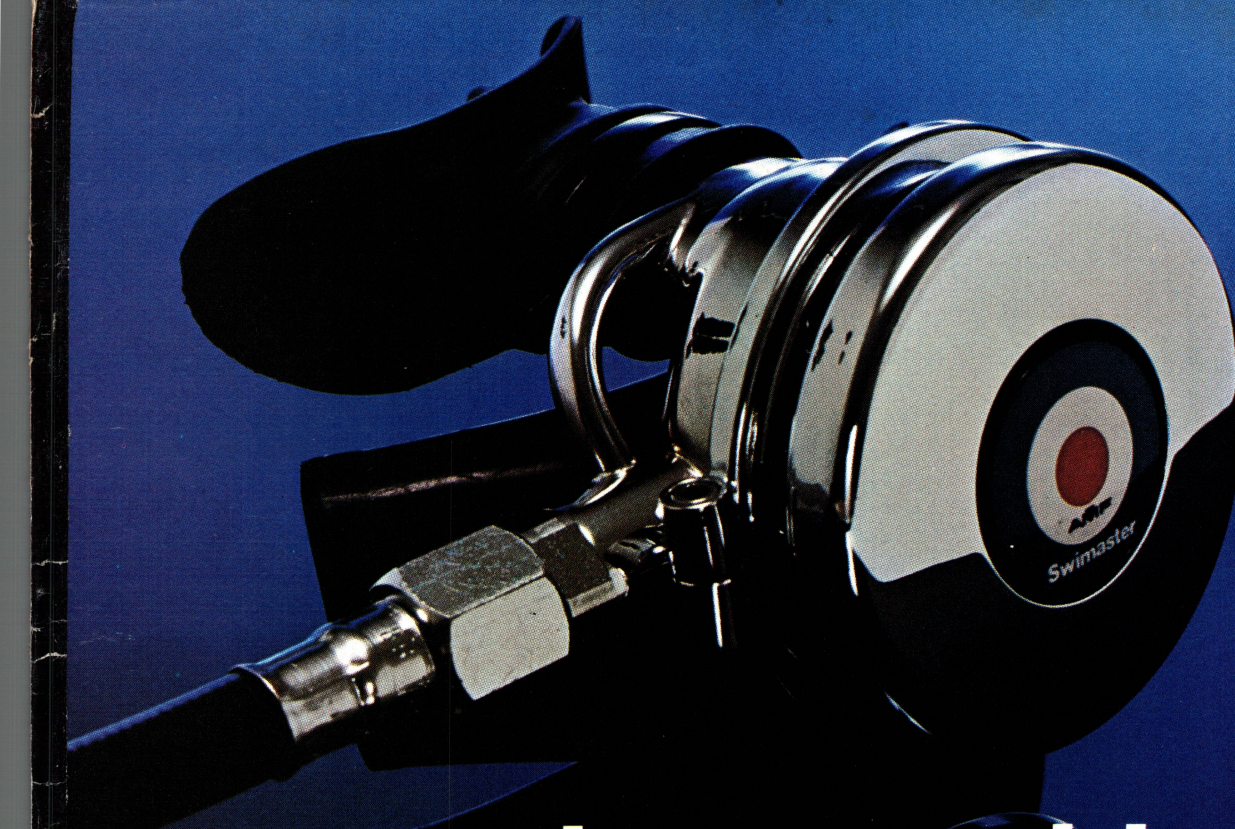


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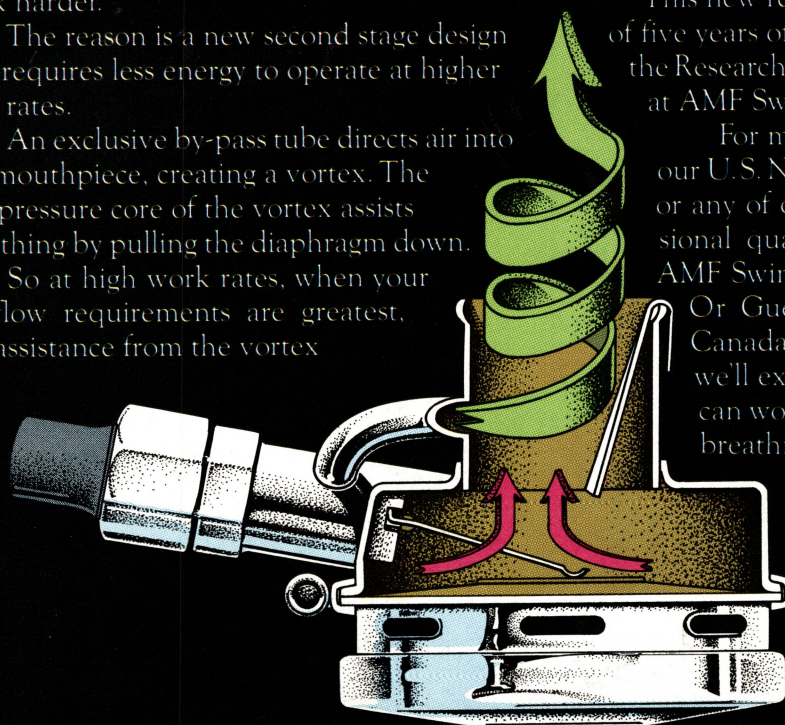
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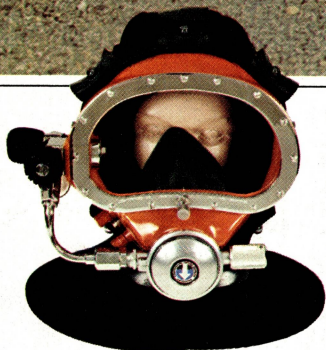
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